

Aviation Occurrence Reports

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AVIATION OCCURRENCE REPORTS

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FOREWORD

AVIATION OCCURRENCE REPORTS

In accordance with the CASB Act, part of the Board's objective is to report publicly on its investigations, on the related findings, and on any recommendations designed to eliminate or reduce safety deficiencies.

The AVIATION OCCURRENCE REPORTS Publication contains reports on CASB investigations, findings, and recommendations adopted by the Board and occurrence briefs. The sole intent in providing this information is to advance aviation safety. It is not the object of the Board to determine or apportion any blame or liability in connection with aviation occurrences.

Anyone wanting to employ the AVIATION OCCURRENCE REPORTS for purposes other than advancing aviation safety could find the information incomplete.

This publication is also available in French.

Cette publication est également disponible en français.

A limited number of copies of this publication are retained and are available from:

On peut obtenir des exemplaires de la présente publication en nombre limité auprès du:

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This publication contains reports of aviation occurrences, in Canada, involving Canadian or foreign-registered aircraft.



TABLE OF CONTENTS

	Page
EXPLANATORY NOTES	
DEFINITIONS	vii
REPORTS AND SYNOPSES	
I FIXED-WING CONVENTIONAL AIRCRAFT:	
A. Public Transportation	
(i) 5 700 kg (12,500 lb) and over	1
(ii) Under 5 700 kg (12,500 lb)	28
B. Commercial Training	
(i) Flying Clubs and Commercial Specialty Training	54
C. Other Commercial Operations	63
D. Private	
(i) Wheeled landing gear	90
(ii) Other (float, skis, hull, amphibious)	136
E. State	163
II ROTARY-WING AIRCRAFT:	
A. Commercial Operations	174
B. Private	196
C. State	198
III OTHER TYPES:	
A. Amateur-built, ultralights, gliders, balloons, and others	199
ANNEXES	
Annex 1 — List of reports by aircraft manufacturer and type	233
Annex 2 — List of reports by province/territory of occurrence	241



EXPLANATORY NOTES

TYPES OF REPORTS

The CASB currently produces four types of occurrence reports: there are three investigation report formats and the brief. The most common investigation report format is the Summary Report which summarizes the details of the investigation in one or two pages. Intermediate Reports are somewhat longer and more detailed. For both these types, the complete public report is reproduced in this publication. More factual information is available on Summary and Intermediate Reports and can be obtained by contacting the CASB and referencing the report number. A small number of investigations (generally 15 to 20 per year) result in International Civil Aviation Organization (ICAO) format reports. For the latter type of report, only the Synopsis and the Conclusions and Recommendations sections of the report are included in this publication. The full report can be obtained by contacting the CASB and referencing the report number (which is included with the Synopsis). An aviation occurrence brief is a short narrative history of the flight and occurrence. It includes pertinent information based on a report by the pilot or operator of the aircraft. Laboratory reports, if laboratory analysis has been carried out, are available for all three categories of reports and can be obtained in the same manner.

GROUPING OF REPORTS

For ease of reference, the reports in this publication are grouped by broad category of aircraft type and by type of operation within each group. The reports are then presented chronologically (by the date of the occurrence) within each subgroup.

For fixed-wing conventional aircraft, the first subgroup is Public Transportation. This includes scheduled, other unit toll, and charter operations. Note that this subgroup is further divided into occurrences involving (i) aircraft of 5 700 kg (12,500 lb) or over and (ii) aircraft under 5 700 kg (12,500 lb). The second subgroup is Commercial Training. This includes licensed flying clubs and commercial specialty training (commercial licence classes 6 and 7, respectively). All other types of fixed-wing aircraft commercial operations are grouped under Other Commercial Operations. The Private aircraft subgroup includes all privately registered aircraft, both personal and corporate. It is further subdivided according to type of landing gear. The final subgroup contains occurrences involving state-owned aircraft.

For the rotary-wing category, there are fewer aircraft and fewer occurrences. Thus, only three subgroups are used, viz. Commercial, Private, and State.

The final category contains reports and briefs for all other types. This includes amateur-built aircraft, ultralights, gliders, balloons, etc.

CONTENTS OF SUMMARY REPORTS AND INTERMEDIATE REPORTS

Information on Aircraft:

The first block of each report identifies the type of aircraft involved in the occurrence, the model, the registration, the location, and the date of the occurrence; for commercially operated aircraft, the operator is also identified.

Occurrence Report Number:

The second block commences with the occurrence report number (any queries to the CASB should carry this reference). The first two numbers identify the year of the occurrence, the first letter identifies the CASB office that conducted the investigation ('A' - Atlantic, 'Q' - Quebec, 'O' - Ontario, 'C' - Central, 'W' - Western, 'P' - Pacific, 'H' - Head Office). The first number after the letter identifies the year of the

decade of the occurrence. This block also contains information on the type of investigation (a correspondence investigation is one in which the site of the occurrence was not visited by a CASB investigator), the time of the occurrence, the type of operation, the extent of damage to the aircraft, and the type of licence held by the pilot.

Pilot Hours:

This block indicates the total number of hours the pilot had acquired on all types of aircraft, the total number of hours on type, and the number of hours flown in the last 90 days (in total and on type).

Injuries:

The injuries sustained by the crew, passengers, or others are classified as Fatal, Serious, or Minor/None (See Definitions).

Summary Report Narrative:

The narrative summarizes the history of the flight, pertinent factual information and analysis. The narrative is divided into two parts:

- (a) the factual information or a description of what happened, which begins with a description of the history of the flight as close as possible to the occurrence, followed by the pertinent information; and
- (b) an analysis of why the occurrence happened.

Reported Circumstances: (Briefs only)

The narrative summarizes the pertinent information based on a report by the pilot or operator of the aircraft.

Findings: (Reports only)

The Board's findings from an investigation are grouped under two subheadings, as follows:

Cause-Related Findings: Any element of the occurrence, found during the investigation which, if removed, would have prevented the occurrence, or, if removed, would have avoided or reduced damage to property and people.

Other Findings: Information, discovered during the investigation of an occurrence, which is not cause related but has the potential to enhance or degrade aviation safety.

Safety Action:

For all aviation occurrence investigations, relevant data are recorded to facilitate statistical analysis and the identification of system-wide safety deficiencies through safety studies. In cases where an individual occurrence investigation leads to significant safety action being taken, that action is included in the public report immediately after the Findings.

DEFINITIONS

(Extracted from the Canadian Aviation Safety Board Act/Regulations)

"AVIATION OCCURRENCE"

- (a) any accident or incident associated with the operation of aircraft, and
- (b) any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident described in paragraph (a).

"ACCIDENT"

"ACCIDENT" means any aviation occurrence where, at any time during the period commencing when the first person boards an aircraft for the purpose of flight and ending when the last person disembarks from the aircraft after the flight,

- (a) a person other than a stowaway, sustains a serious injury or fatal injury, that is not self-inflicted or inflicted by another person or caused by natural causes, as a result of that person
 - i) being in the aircraft,
 - ii) coming in direct contact with any part of the aircraft, including any part that may have become detached from the aircraft, or
 - iii) being directly exposed to the jet blast of the aircraft,
- (b) the aircraft sustains damage or structural failure adversely affecting the structural strength, performance or flight characteristics of the aircraft and normally requiring major repair or replacement of any affected component part, other than damage or failure that is limited to
 - i) the engine, its cowling, or its accessories,
 - ii) the propellers, wing tips, antennae, tires, brakes or fairings, or
 - iii) small dents or puncture holes in the aircraft skin, or
- (c) the aircraft is missing or is completely inaccessible.

"SERIOUS INJURY"

"SERIOUS INJURY" means an injury that is sustained by a person in an accident and that

- (a) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was sustained,
- (b) results in a fracture of any bone, other than a simple fracture of the nose or of any fingers or toes,
- (c) involves lacerations that cause severe haemorrhage or nerve, muscle or tendon damage,
- (d) involves injury to any internal organ, or

- (e) involves second or third degree burns, or any burns affecting more than five per cent of the body surface.

"INCIDENT"

"INCIDENT" means an aviation occurrence, other than an accident, that affects or could affect the safe operation of an aircraft. Incidents can be reported to the CASB through mandatory or voluntary reporting mechanisms.

According to the CASB regulations a "reportable incident" means any incident involving an aircraft with a maximum certified take-off weight greater than 5 700 kg where

- (a) an engine fails,
- (b) smoke or fire occurs, other than an engine fire that is contained within the engine and does not result in engine failure or damage to other component parts of the aircraft,
- (c) difficulties in controlling the aircraft in flight are encountered due to any aircraft system malfunction, weather phenomena, wake turbulence, operations outside the approved flight envelope, or uncontrolled vibrations,
- (d) the aircraft fails to remain within the intended landing or take-off area, lands with one or more landing gear retracted, or drags a wing tip or engine pod,
- (e) any crew member is unable to perform his flight duties as a result of incapacitation,
- (f) decompression, explosive or otherwise, occurs that necessitates an emergency descent,
- (g) a fuel shortage occurs that necessitates a diversion or requires approach and landing priority at the destination of the aircraft,
- (h) the aircraft is refuelled with the incorrect type of fuel or contaminated fuel that is undetected prior to departure from the ramp,
- (i) a collision or risk of collision with any other aircraft or with any vehicle, terrain or obstacle occurs, including a collision or risk of collision that may be related to air traffic control procedures or equipment failures,
- (j) a flight crew member declares an emergency or indicates any degree of emergency that requires priority handling by an air traffic control unit or the standing by of a crash, fire fighting or rescue services, or
- (k) toxic gases or corrosive materials leak from any cargo aboard the aircraft.

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MOONEY M20J C-GIMC
EDMONTON MUNICIPAL AIRPORT, ALBERTA
20 JUNE 1984

REPORT NUMBER: 84-W44055 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1230 MDT
OPERATION: Private Company Business
DAMAGE: Minor
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	800	20
LAST 90 DAYS	10	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

In order to avoid wake turbulence, the pilot landed beyond the touchdown point of the preceding aircraft. The aircraft landed hard, nosewheel first, and bounced twice. The pilot was unable to control the aircraft, and, on the third impact, the nose gear failed. The aircraft slid on its nose and main landing gear to a stop on the runway.

The pilot did not report encountering turbulence during the landing. The bouncing manoeuvre was identified as a porpoise. A porpoise normally occurs if the landing speed is high or if some other agent has acted to pitch the aircraft nose-down as it lands. In this case, the cause of the porpoise was not determined. The nose gear failed as a result of overloads imposed during the porpoise.

FINDINGS:

Cause Related:

1. The aircraft porpoised on landing.
2. The nose gear failed as a result of overloads.

Other:
-Nil-

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RISK OF COLLISION BETWEEN: ILYUSHIN 62
and MCDONNELL DOUGLAS DC-10
NORTH ATLANTIC
19 MARCH 1985
LOCAL TIME: 1320 UTC
INFORMATION SOURCE: Field Investigation

ILYUSHIN 62

REPORT NUMBER: 85-A54908 (Incident)
OPERATOR: Polish National Airlines
OPERATION: Scheduled Service
DAMAGE: None
PILOT LICENCE: Unknown

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

MCDONNELL DOUGLAS DC-10

REPORT NUMBER: 85-A54908 (Incident)
OPERATOR: Wardair
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Airline

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

SUMMARY REPORT:

A DC-10 and an IL62, westbound across the North Atlantic, experienced a loss of separation when the IL62 was cleared by Gander Oceanic Control to climb through the altitude of the DC-10 (FL330). An invalid 20-degree west estimate on the DC-10 was sent from Shanwick Oceanic Control. The data strip used by the Gander controller, who issued the climb clearance, was

Aviation Occurrence Reports

based on this invalid time. The primary protection for discovering this type of error is the actual 20-degree west position report. This report on the DC-10 was placed in an "actioned" basket without being actioned. The Unit Operations Manual procedure of coordinating climb clearances within 20 minutes of the common boundary (Shanwick/Gander) was not followed. The two aircraft had approximately one minute of longitudinal separation when the IL62 climbed through FL350.

The original error in Shanwick was made when the automatic data transfer system was unserviceable and manual inputs were being made. The actual 20-degree west position report was stuck to the back of an actioned report and was placed in an "actioned" basket. The controller who issued the climb clearance was using a 10-minute coordination instead of the 20-minute standard.

FINDINGS:

Cause Related:

1. The proposed 20-degree west time for the DC-10 which was sent from Shanwick to Gander was in error.
2. The actual 20-degree west position report from the DC-10 was not actioned.
3. The 20-minute coordination standard, which is outlined in the Unit Operations Manual, was not followed.
4. The two aircraft had approximately one minute of longitudinal separation when the IL62 climbed through FL350.

Other:
-Nil-

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NORDAIR LTD.

FAIRCHILD FH227D C-FNAK

CAPE YOUNG (NORTHWEST TERRITORIES)
21 FEBRUARY 1984

REPORT NUMBER: 84-Q44011 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 1000 MST

OPERATION: Charter

DAMAGE: Substantial

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,420	575
LAST 90 DAYS	172	172

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	11

SUMMARY REPORT:

The turboprop aircraft was on approach to runway 13 of the Cape Young Airport after changing to visual flight rules (VFR) at about 1,000 feet above ground level (agl). When the crew sighted the runway, the aircraft was too high to land. The captain then decided to overshoot the runway on the right side and to turn 90 degrees left in order to return by means of a right turn and make an approach to runway 31. During the turn, the crew lost sight of the runway, and visual contact was regained only after completion of the right turn. The aircraft then followed a very steep approach slope, but was still high on short final, and touched down 3,000 feet beyond the threshold of the 4,675-foot runway. The aircraft could not be stopped on the runway and struck a plywood marker before coming to rest in deep snow 40 feet beyond the end of the runway. The right propeller and right engine were damaged.

According to a special meteorological observation made immediately after the accident, the visibility was one mile in ice fog. The runway had a base of frozen compacted snow and was covered with a thin layer of crystallized snow which made the surface slippery.

The poor visibility and almost complete absence of visual references resulted in a whiteout condition which twice prevented the crew from following a normal approach slope. Furthermore, neither runway 13 nor runway 31 was equipped with a visual approach slope indicator system. Although the captain was aware that the landing was too long, he relied on wheel braking to stop the aircraft. However, the brakes were ineffective because of the slippery surface.

The recordings made by the flight data recorder (FDR) and the cockpit voice recorder (CVR) were analysed. The FDR readout indicated that the altitude styllet was in continual contact with the metal tape instead of making a mark once every second. The lateral movements of the styllet to record the altitude were therefore restricted by the steel tip, which tended to remain on the same straight line because of its continual pressure on the tape. In addition, the speed styllet made a deeper mark than might normally be expected, and the static circuit in the recorder was leaking; as a result, the speed and altitude data were incorrect. The heads of the CVR had not been cleaned for a considerable time; the recording was of such low quality as to be largely unintelligible.

FINDINGS:

Cause Related:

1. Because of the whiteout conditions and the absence of a visual approach slope indicator system, the crew was unable to position the aircraft on an approach slope compatible with the performance chart of the aircraft.
2. Despite a very steep approach slope, the aircraft was still too high on short final, and it touched down 3,000 feet beyond the threshold of the 4,675-foot runway.
3. Because the aircraft could not be stopped on the runway as a result of the short distance remaining and the slippery conditions, it struck an end marker before coming to rest in deep snow 40 feet beyond the runway.

Other:

1. The flight data recorder was faulty; the altitude and speed data were therefore erroneous.
2. The cockpit voice recorder was faulty; most of the crew's conversations were therefore unintelligible.

→ → → → →

NORDAIR LTD.
BOEING 737-200 O-OSDE
DORVAL AIRPORT, QUÉBEC
29 FEBRUARY 1984

REPORT NUMBER: 84-Q44903 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0820 EST
OPERATION: International Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	15,000	5,000
LAST 90 DAYS	180	180

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	6
PASSENGERS	-	-	93

SUMMARY REPORT:

The Boeing 737 was rolling for take-off on the snow-covered runway 24L. Approaching decision speed (V1), the crew sighted a truck on the runway ahead of the aircraft. The take-off was continued, and the aircraft became airborne about 1,500 feet before reaching the truck's position.

At the time of the occurrence, maintenance vehicles were in the process of removing the snow that had fallen in the preceding 24 hours. As taxiways parallel to the main runways (24R and 24L) had not yet been cleared, all departures from the main terminal required a backtrack to the take-off position on the active runway. At the same time that the tower controller cleared the 737 to backtrack runway 24L, the ground controller cleared an inspection vehicle onto the same runway to conduct braking tests and snow-depth checks. As the aircraft was taking position at the threshold of runway 24L, the pilot saw the inspection vehicle, which had just reached the same threshold, turn around and speed down the runway. The 737 crew advised that they were ready and obtained their take-off clearance less than a minute later. On the take-off run, at 120 knots, 15 knots below V1, the crew saw that the inspection vehicle was still on the runway. Because of the short distance remaining and the speed of the aircraft, the take-off was continued.

Maintenance and inspection vehicles, wherever they are on the airport, are controlled by the ground controller on the ground frequency. The same applies to aircraft on the ground, except when they are on the active runway, in which case control is assumed by the tower controller on the tower frequency.

Aviation Occurrence Reports

Ground and tower controllers do not normally maintain a listening watch on each other's frequencies. Standard operating procedures required that the ground controller requested from the tower controller a clearance to use a runway when he wished to release a vehicle on this runway. When this clearance was given, the ground controller would activate a runway status light switch that would show a red light beside the particular runway number at each controller's position. He would also write a runway update strip to be placed on the tower controller's tray.

The witness statements related to verbal communications between controllers about the clearance to use the runway for vehicle traffic were contradictory. The control tower was not equipped with any means of recording conversations in the working area. It was determined that the runway 24L status light was red at the time the 737 was doing its take-off run. A runway update strip had not been written. About 20 seconds after he had cleared the aircraft for take-off, the tower controller noticed that the red status light was on; however, there was not enough time to coordinate the removal of the vehicle from the runway.

The standard coordination of the movement of the inspection vehicle on the active runway was not carried out between the ground and tower controllers.

FINDINGS:

Cause Related:

1. Standard coordination of the movement of the inspection vehicle on the active runway was not carried out between the ground and tower controllers.

2. The aircraft was cleared for take-off while the inspection vehicle was on the runway.

Other:

- Nil -

SAFETY ACTION:

Action Taken:

Dorval control tower unit has revised its procedures and modified its equipment to ensure coordination between tower and ground personnel with respect to runway usage and closure.

→ → → → →

PACIFIC WESTERN AIRLINES LTD.
BOEING 737-200 C-GQPW
CALGARY INTERNATIONAL AIRPORT
CALGARY, ALBERTA
22 MARCH 1984

REPORT NUMBER 84-H40003

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	10,000	6,000	6,800	2,100
LAST 90 DAYS	120	120	150	150
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	5	
PASSENGERS	-	4	110	

SYNOPSIS

During the take-off roll, the flight crew heard a loud bang which was accompanied by a slight veer to the left. The take-off was rejected, and all 119 persons successfully evacuated the aircraft when a severe fuel-fed fire developed.

The Canadian Aviation Safety Board (CASB) determined that an uncontained failure of the left engine thirteenth stage compressor disc had occurred. Debris from the engine punctured a fuel cell, resulting in the fire. The disc failure was the result of fatigue cracking.

FINDINGS

Cause-Related Findings

1. An uncontained rupture of the left engine thirteenth stage compressor disc occurred approximately 1,300 feet into the take-off roll.
2. Failure of the disc was the result of fatigue cracking at three main locations in the rear snap and adjacent to 6 of the 12 tie-bolt holes.
3. Fatigue cracking initiated as a result of an unidentified combination of factors which developed progressively over an undefined period of time, following the last major overhaul in May 1981.
4. Some stator repair procedures carried out at the last major overhaul were not in accordance with the provisions of the Pratt & Whitney JT8D engine overhaul manual; as a result, deficiencies in the thirteenth stage stator assembly occurred.

5. The ruptured piece of the compressor disc exited the engine and penetrated the left lower inboard wing skin, puncturing a fuel cell.

6. Fuel leaking from the punctured fuel cell was ignited instantaneously.

7. The fuel-fed fire increased in size and engulfed the left wing and aft section of the aircraft.

Other Findings

1. The flight crew reacted promptly to the abnormality in the take-off run by initiating a rejected take-off.

2. The aircraft was not brought to a stop in accordance with the published rejected take-off procedure.

3. Communication and coordination between the cabin and the flight deck did not result in an early appreciation of the problem and resulted in a significant delay before the flight crew was aware of the existence and seriousness of the fire.

4. Air traffic services personnel were immediately aware of the fire but did not immediately inform the flight crew.

5. The flight crew relied excessively on the cockpit fire warning indicators to confirm the existence of fire.

6. Published emergency procedures and training did not provide adequate guidance in the event of a general aircraft fire.

7. Once aware of the fire, the flight crew did not immediately take appropriate emergency action.

8. All 114 passengers and 5 crew members successfully evacuated the aircraft.

9. No specific command to evacuate the aircraft was given.

10. Some passengers initiated an evacuation through the right over-wing exit.

11. Most passengers were regular travellers, familiar with the Boeing 737; this contributed to the success of the evacuation.

12. The last passengers to evacuate the aircraft evacuated at about the last possible moment.

13. The aircraft was not brought to a stop on the runway, thereby limiting the paved manoeuvring space available for the Crash Firefighting and Rescue vehicles.

14. Crash Firefighting and Rescue services were hampered by the difficulty encountered by a vehicle traversing the soft, wet terrain.

15. Calgary International Airport Emergency Procedures did not contain procedures for the exercise of control over passengers being evacuated onto the airport infield.

16. Debris from the accident aircraft was cleared from the runway by airport personnel without the required authorization from safety investigators.

17. The aircraft crew was certified and qualified for the flight in accordance with existing regulations.

18. The aircraft was certified and equipped in accordance with existing regulations and approved procedures.

19. The aircraft's weight and centre of gravity were within the prescribed limits.

SAFETY ACTION

Action Taken

The Canadian Aviation Safety Board (CASB) notes that as a result of this occurrence, the air carrier has taken the following corrective action with respect to its Boeing 737 emergency and standard operating procedures:

a) Pacific Western Airlines has instituted combined recurrent emergency procedures training for flight and cabin crews in order to improve total crew coordination during emergencies;

b) Modifications to the service interphone system and cabin to cockpit call lights are underway to allow direct and immediate communication between the flight and cabin crew; and

c) Emergency procedures training now emphasizes the need to stop the aircraft immediately and determine the cause of the rejected take-off. For fires-on-the-ground, training puts greater emphasis on visual inspection by opening the cockpit window and by soliciting information from any and all sources.

Action Required

Quality Control of Engine Overhaul Procedures

The CASB notes the manufacturer's findings that a higher than normal vibratory stress in the accident engine was produced by coincidence between the thirteenth stage compressor rotor and stator. The excessive stress can be partly attributed to the loss of damping

caused by a loose outer snap fit between the twelfth and thirteenth stators.

The undersized mounting flange on the thirteenth stage inner shroud and the reduction in height of the front lip of the inner shroud were also found to be contributory to the condition. A combination of these and other unidentified factors resulted in the formation of the high-cycle fatigue cracks which propagated until the eventual failure of the thirteenth stage compressor disc.

The CASB is aware that the failure of the thirteenth stage compressor disc in the accident engine is the first such occurrence since the disc design was modified in 1968 to correct previously identified vibratory stress problems. Furthermore, the CASB recognizes that the circumstances that led to this occurrence may well have been unique to the accident engine.

Nevertheless, the CASB believes that deficiencies in quality control during engine overhaul allowed critical engine components that did not meet the manufacturer's specifications to be re-entered into service. Therefore, the CASB recommends that:

The Department of Transport take the necessary steps to ensure that critical Pratt & Whitney JT8D engine components fully comply with manufacturer's specifications during reassembly at any overhaul facility.

CASB 87-01

Response to Emergencies

The Board believes that reaction to critical emergencies which require an immediate response, during the take-off phase of flight for example, should seldom be dependent upon judgement. Airlines have long recognized that emergency procedures based upon standard and pre-conditioned responses ensure the greatest probability of correct reaction to a specific emergency.

This occurrence highlights the need for immediate and aggressive action to ensure that the aircraft is stopped and passengers and crew are evacuated as quickly as possible during an aircraft-on-the-ground fire. Effective coordination and exchange of information between the cockpit and cabin crew, air traffic services personnel, and the CFR service is necessary to ensure that lives and property are exposed to minimal risk.

The CASB wishes to underline the requirement for all cockpit and cabin crew, air traffic services, and airport personnel to be trained to the point where they respond promptly to an emergency, such as an aircraft fire, in accordance with pre-established and practised procedures.

Air Traffic Services Response During an Emergency

The Air Traffic Control Manual of Operations (MANOPS) does not specifically require air traffic services personnel to advise flight crew as soon as an aircraft fire is observed. Nor is there reference made in air traffic services plans and procedures to the fact that notification of flight crews by air traffic services personnel may save valuable seconds in stopping burning aircraft on the ground as quickly as possible. MANOPS provides general guidance to controllers regarding the need to ensure that flight crews are apprised of conditions that may affect the safety of flight; however, specific direction is not given as to the critical nature of emergencies during the take-off phase of flight. Consequently, the CASB recommends that:

The Department of Transport revise its training syllabus, procedures, and Air Traffic Control Manual of Operations (MANOPS) to require that air traffic services personnel take immediate action to inform the pilots of an aircraft of any observed condition that may adversely affect that aircraft's safety, such as a fire.

CASB 87-02

Cockpit/Cabin Crew Response to an Emergency

The flight crew of Pacific Western Airlines, Flight 501, rejected the take-off immediately upon hearing the loud bang emanating from the left side of the aircraft. Having observed no indications to the contrary, they proceeded in the incorrect belief that a blown tire was the source of the loud bang. The flight crew reacted immediately and correctly to the emergency during the take-off roll by rejecting the take-off; however, after decelerating to taxiing speed, the flight crew did not stop the aircraft and determine the cause of the loud bang.

Air traffic services personnel did not immediately advise Flight 501 of the fire's existence, as it was assumed that the flight crew were aware of the fire. The cabin crew were not able to immediately contact the flight crew, either directly or via the service interphone, and advise that a fire was under the left wing. When the flight crew were apprised of the existence of the fire, the information conflicted with their initial assumption that a tire had blown. The resolution of this conflict resulted in further delay in stopping the aircraft and commencing an evacuation.

The CASB believes that this occurrence highlights deficiencies in cockpit crew response to an aircraft-on-the-ground emergency; cockpit crew/cabin crew coordination during an emergency; cockpit crew/air traffic services coordination; and the service interphone system. The deficiencies in cockpit crew, cabin crew, and air traffic services coordination may be attributable in part to a lack of consultation between these three groups

during the development of emergency procedures. As a consequence, the CASB recommends that:

The Department of Transport require that on-the-ground emergency procedures and training emphasize the need to stop an aircraft immediately and determine the nature of the emergency;

CASB 87-03

The Department of Transport require that emergency procedures and training incorporate coordinated responses by the total crew complement; and

CASB 87-04

The Department of Transport require that transport category aircraft have a means for the cabin crew to alert the cockpit crew directly and immediately of any critical on-board emergency.

CASB 87-05

Emergency Fire Procedure

The flight crew's inability to quickly assess the true nature of the emergency and the consequent need to stop and evacuate the aircraft can be partly attributed to the fact that the flight crew was unable to recognize that the aircraft was on fire. Without the engine, auxiliary power unit (APU), or cargo passenger compartment fire or smoke alarms being activated, the cockpit crew had difficulty accepting the delayed information provided by the purser and air traffic services personnel that a fire was underway. Existing emergency procedures, reinforced through simulator and recurrent training, are based on the premise that aircraft sensors will first signal a fire warning. Clearly, critical fires can occur which will not be promptly detected by on-board sensors. In the accident aircraft, a fuel-fed wing fire was not apparent to the flight crew until the fire was well underway. Therefore, the CASB recommends that:

The Department of Transport require that emergency procedures be implemented for those fires which do not immediately activate on-board fire or smoke detection systems.

CASB 87-06

Hazard of Failed Engine Components to Aircraft Structure

The CASB recognizes that, under present certification requirements, turbine engines are not required to contain failed discs. Nevertheless, failed engine components that exit an engine constitute an extreme hazard to the aircraft structure. In the Boeing 737 and other aircraft with wing-mounted engines, the proximity of the engines to the wing fuel tanks presents a critical situation during uncontained engine failure, as witnessed by this and other occurrences. In addition, the Iberia International

al Airlines, Douglas DC-9 occurrence at Madrid, Spain on 15 September 1979 shows that the hazards associated with uncontained engine failures are not unique to aircraft with wing-mounted engines or solely associated with the presence of fire. As a result, the CASB recommends that:

The Department of Transport review current aircraft design criteria with the long-term objective of reducing or eliminating the hazard of uncontained engine components compromising the airworthiness of the aircraft.

CASB 87-07

Calgary International Airport Disaster Plan

Although the Calgary International Airport Disaster Response Plan was developed in accordance with the Department of Transport's Standards for Plans and Procedures for Airport Emergencies, the possibility of a large number of survivors of an on-the-field aircraft accident was not foreseen. The lack of coordination, control, and transport of the survivors not requiring medical attention resulted in passengers departing the airport terminal prior to a complete survivor list being compiled.

In order to minimize the possibility of a recurrence, the CASB recommends that:

The Department of Transport revise its Standards for Plans and Procedures for Airport Emergencies to ensure that the control of survivors of on-the-field aircraft accidents is sufficient to enable the timely and accurate compilation of survivor lists and details as to where survivors can be located.

CASB 87-08

Furthermore, debris from the accident aircraft was cleared from the runway by airport authorities without the consent of the investigator-in-charge. The CASB recognizes the need to return runways to operational service in as timely a manner as possible, in order to minimize the impact upon air traffic. However, from an accident investigator's perspective, it is essential that aircraft wreckage remain undisturbed to allow the gathering of the maximum possible evidence about the contributing factors and causes of the accident. Therefore, the CASB recommends that:

The Department of Transport revise its Standards for Plans and Procedures for Airport Emergencies to take into account section 7 of the CASB Regulations and require authorization by the CASB investigator-in-charge prior to the accident runway being cleared and returned to operational service.

CASB 87-09

Other Safety Concerns

1. Crash Firefighting and Rescue Vehicles Suitable for Canadian Environmental Conditions

Conventionally wheeled CFR vehicles are constrained in their ability to manoeuvre on soft or unprepared terrain. The CASB notes that the Department of Transport received Treasury Board approval in September 1983 to acquire six all-terrain CFR vehicles (for use at Edmonton, Calgary, Winnipeg, Dorval, Halifax, and Gander) in addition to the three presently in use at the Toronto/Lester B. Pearson, Mirabel, and Vancouver International Airports. It is understood that the first of the six all-terrain CFR vehicles will be available for service by mid 1987. Treasury Board approval has also been received for the acquisition of 68 rapid intervention all-terrain CFR vehicles for use at airports across Canada.

The CASB supports this improvement in all-terrain CFR capability. Since Canada is a world leader in the development of large all-terrain vehicles, the CASB encourages further efforts by the Department of Transport to develop even better all-terrain vehicles to meet Canadian environmental conditions - particularly with respect to load-carrying capability and manoeuvrability.

2. Cabin Safety

Fires that occur in transport category aircraft continue to provide graphic proof of their swift and catastrophic effect on passengers and crews. The CASB notes that much effort has been expended over the years to improve cabin safety in transport category aircraft, particularly, the recent revisions to Air Navigation Orders (ANO) Series II, Nos. 28, 29, and 30, requiring the installation of fire-blocking materials, floor proximity emergency escape path marking and HALON fire extinguishers in passenger compartments of transport category aircraft. These revisions to the ANOs were signed by the Minister of Transport on 06 June 1986, and compliance is required by 31 December 1988.

While the CASB commends these much-needed advances, fire-related occurrences such as this one confirm the need for further effort. Toxic gases generated by synthetic materials used in aircraft cabins quickly create a lethal environment for passengers and crew of a burning aircraft. Additionally, dense smoke in the cabin reduces visibility and limits survivors' ability to quickly select the best escape route.

A number of the recommendations put forth as a result of this occurrence seek to improve the emergency procedures used to evacuate survivors and thereby reduce the time passengers and crews are exposed to risk in a burning aircraft. The CASB will carefully monitor such ongoing efforts to improve cabin safety, such as passenger smoke hoods, and will consider further safety action to

reduce the lethal nature of fires in transport category aircraft.

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AIR CANADA

BOEING 727 C-GAAO

TORONTO/LESTER B. PEARSON

INTERNATIONAL AIRPORT, ONTARIO

04 MAY 1984

REPORT NUMBER: 84-O/44026 (Incident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1110 EDT

OPERATION: Scheduled Domestic

DAMAGE: Minor

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10,089	263
LAST 90 DAYS	123	123

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	7
PASSENGERS	-	-	100

SUMMARY REPORT:

The aircraft took off from runway 33 at Lester B. Pearson International Airport at Toronto. At about 700 feet above ground level on initial climb, the number two (centre) engine (Pratt and Whitney JT8D-15) failed. The engine was shut down, the engine fire extinguishing system was activated, and an uneventful landing was carried out about 20 minutes later on runway 06.

The engine failure was uncontained; parts from the turbine section penetrated the engine case and cowling and were found along the side of the departure runway. The aircraft aft fuselage and empennage had been struck by flying debris. The engine failure was initiated by the failure of the second stage turbine disc which then caused severe damage to the third and fourth stage turbines and associated components.

The second stage turbine disc failed in overload following high-cycle, low-stress fatigue cracking. The fatigue cracking originated in the outer radius of the bottom of the airseal groove on the rear face of the disc. This groove had been repaired 3,598 engine hours previously by nickel plating and machining. The machining process following nickel plating was either not completed or was inadequate as the outer and inner radii of the groove were much sharper than specified - about 0.003 inches versus the specified 0.020 to 0.030 inches. Fretting damage was also observed on the groove bottom and

sides; this damage can be caused by a loss of disc/air-seal contact. Loss of disc/airseal contact also results in axial wear with associated high amplitude resonance and increased stress on the disc. The high stress levels, in combination with the lowered fatigue resistance because of the stress concentration effect of the sharp radii, led to fatigue cracking and ultimate overload failure of the disc.

The following laboratory report was completed:
LP 160/84 - No. 2 Turbine Disc Failure, Boeing 727
C-GAAO, 4 May 1984.

FINDINGS:

Cause Related:

1. The second stage turbine disc in the number two engine failed causing severe engine damage and failure.
2. The fatigue cracking originated at the sharp radii of the airseal groove in the disc. The sharp radii were the result of either incomplete or inadequate machining during repair.

Other:
-Nil-

SAFETY ACTION:

Action Taken:

The Federal Aviation Administration (FAA) issued an Airworthiness Directive (AD) 85-19-15 R1 effective 26 December 1985, which required the inspection and repair of second stage turbine discs and modification of the mating third stage turbine inner airseal on P&W JT8D-15, 17, -17R turbo fan engines that had reached specific service times. Air Canada had complied with this AD requirement well in advance of the specified date for its applicable engines. Furthermore, Air Canada has implemented a program to eliminate the use of repaired discs and to subsequently fit all second stage turbine discs to the revised fit standard of P&W Service Bulletin 5510.

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AIR CANADA
MCDONNELL-DOUGLAS DC-9-32 C-FTLJ
LESTER B. PEARSON INTERNATIONAL
AIRPORT, TORONTO, ONTARIO
11 MAY 1984

REPORT NUMBER: 84-O44031 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2004 EDT
OPERATION: Scheduled Domestic
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,846	6,861
LAST 90 DAYS	146	146

	FATAL	SERIOUS	MINOR/NONE
INJURIES:			
CREW	-	-	5
PASSENGERS	-	-	100

SUMMARY REPORT:

The aircraft was taking off from runway 24R at Lester B. Pearson International Airport on a scheduled flight. As the aircraft accelerated through V1 (critical engine failure recognition speed), the pilot occupying the left seat heard an explosive sound and noticed that the right engine instruments indicated a compressor-stall condition. The take-off was continued, and the right engine was shut down. The landing gear could not be retracted.

The crew coaxed the aircraft up to a safe altitude, flew over Lake Ontario, and then proceeded to dump fuel. Meanwhile, ground personnel inspected runway 24R and found numerous pieces of tire rubber; this information was relayed to the crew. After sufficient fuel was dumped, the crew prepared for an emergency landing on runway 33, the landing was completed without further incident, and the crew stopped the aircraft on the runway where the landing gear was examined and safetied. The aircraft was then taxied to the ramp where the passengers deplaned.

An inspection of the aircraft revealed that the right in-board tire had lost its tread layer around its total circumference. The trailing edge of the right wing flap had sustained minor damage, and there was evidence that the right engine had ingested parts of the tire. The hydraulic line to the right main gear actuating cylinder had broken off at the lower fitting, thus preventing the retraction of the gear.

The tire was almost completely stripped of tread material, and the outer plies of the cord body were ruptured in several places; however, the tire remained inflated. The tire had been retreaded six times.

Inspection of the tire revealed that portions of the two outer body plies had been buffed out during a retread operation prior to the sixth retreading. There was also evidence in holograph records of looseness in the body of the tire. Portions of the tire exhibited signs of rubber reversion as a result of excessive heat buildup, probably caused by overdeflection.

The cause of the tire failure was not positively determined. However, the CASB engineering report states that factors which may have contributed to the failure were: overdeflection resulting from underinflation or overloading for some period of time during the life of the tire; and localized damage to the carcass plies during the buffing phase of a retread operation previous to the sixth retread.

The following laboratory report was completed: LP 170/8C - Analysis of Main Wheel Tire Failure, DC-9.

FINDINGS:

Cause Related:

1. The failure of the right main inboard tire was due to ply damage.
2. Parts of the tire were ingested by the right engine, requiring the engine to be shut down.
3. When the tire separated, the hydraulic line to the main gear actuating cylinder was damaged, thus preventing retraction of the main gear.

Other:

- Nil -

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RISK OF COLLISION BETWEEN: MCDONNELL DOUGLAS DC-9-32 C-FTLM and CONVAIR 580 (MILITARY COSMOPOLITAN CC109) CALLSIGN CAM 3730

**TORONTO/LESTER B. PEARSON INTERNATIONAL AIRPORT, ONTARIO
15 NOVEMBER 1984**

LOCAL TIME: 1822 EST

INFORMATION SOURCE: Field Investigation

MCDONNELL DOUGLAS DC-9-32 C-FTLM

REPORT NUMBER: 84-O/44088 (Incident)

OPERATOR: Air Canada

OPERATION: Scheduled Domestic

DAMAGE: None

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	Unknown	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	Unknown
PASSENGERS	-	-	Unknown

CONVAIR 580 (MILITARY COSMOPOLITAN CC109) CAM 3730

REPORT NUMBER: 84-O/44088 (Incident)

OPERATOR: Canadian Military

OPERATION: State

DAMAGE: None

PILOT LICENCE: Not Applicable

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	Unknown	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	2

SUMMARY REPORT:

A military Cosmopolitan aircraft landed at night on runway 24R and was still on the runway when a DC-9 aircraft was cleared for take-off, also on runway 24R. The DC-9 passed about 100 feet over the Cosmopolitan.

The weather at the time was good, and the visibility was 10 miles. Apparently, all the normal running lights on the Cosmopolitan were serviceable and in use.

After the Cosmopolitan landed, it was cleared "next right at 28 (runway intersection)". The pilot commenced a turn to exit at runway 28 but was travelling too fast for that turn and proceeded to the next right, about 1,600 feet further (taxiway J). The tower controller thought he saw the aircraft exit on runway 28; he scanned runway 24R quickly, did not notice any aircraft, and cleared the DC-9 for take-off.

The traffic was moderate to heavy, and the controller was working both runway 24R and 24L. The airport is equipped with Aerodrome Surface Detection Equipment (ground radar) which is used by airport controllers to aid in aircraft control. However, because of its limitations, the unit does not give full airport coverage, and, at the time of the incident, the unit was being used to cover runway 24L, which had the most traffic.

Both aircraft were operating on the same frequency; however, the fact that the DC-9 was given take-off clearance while the Cosmopolitan was still on the runway did not register with the Cosmopolitan crew. The DC-9 was travelling at about 100 knots when its crew saw that the Cosmopolitan was still on the runway.

FINDINGS:

Cause Related:

1. The pilot of the Cosmopolitan was unable to comply with an ATC instruction, but did not advise ATC.
2. The tower controller issued take-off clearance to an aircraft without ensuring that the runway was clear of other traffic.

Other:

1. The available Aerodrome Surface Detection Equipment, which had not yet been commissioned by Transport Canada, did not give full coverage of the airport.

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RISK OF COLLISION BETWEEN: BOEING 767
C-GAVA and FOKKER F-27 C-GNDI
KLEINBURG, ONTARIO, 45
20 NOVEMBER 1984
LOCAL TIME: 2024 EST
INFORMATION SOURCE: Field Investigation

BOEING 767 C-GAVA

REPORT NUMBER: 84-O44090 (Incident)
OPERATOR: Air Canada
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	6
PASSENGERS	-	-	46

FOKKER F-27 C-GNDI

REPORT NUMBER: 84-O44090 (Incident)
OPERATOR: Nordair
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	4
PASSENGERS	-	-	15

HISTORY OF THE FLIGHT:

The Boeing 767 was on V300 airway and was cleared to descend to 15,000 feet. A Fokker F27 was also on V300 airway, cruising at 14,000 feet in the same direction as the Boeing. During its descent, the Boeing went below 15,000 feet and came within 200 feet of the Fokker before climbing back to 15,000 feet. The flight crew of the Boeing did not see the Fokker, and the Fokker flight crew saw the Boeing as it overflew them. Neither crew took evasive action, and both flights landed uneventfully.

PERTINENT INFORMATION:

The weather at the time was good with scattered clouds at 2,000 feet and with no restrictions to visibility.

The radar controller at Toronto Centre, who was monitoring and controlling both flights, requested that the Boeing flight confirm it was level at 15,000 feet. At the time, the Boeing was still in descent and, by the

Aviation Occurrence Reports

captain's altimeter, was passing through 14,600 feet. The aircraft was climbed back to 15,000 feet, but it had descended below its assigned altitude and was estimated by the Fokker flight crew to have come within 200 feet of the Fokker during the transition from descent to climb.

The Boeing captain reported that the level-off protection provided by the flight director system was not available because of an in-flight malfunction, and the altitude alert system was also inoperative. The crew was aware of these unserviceabilities prior to the incident. There were no other reported equipment malfunctions or failures.

The first officer did not reset his altimeter from 29.92 inches to the local altimeter setting of 30.49 inches as required when the flight descended out of the Standard Pressure Region (18,000 feet). As a result, the co-pilot's altimeter indicated 570 feet lower than the actual aircraft height, and the first officer, when asked by the controller to confirm that the flight was level at 15,000 feet, stated that they were climbing out of 14,000 for 15,000.

ANALYSIS:

The Boeing flight crew flew below its assigned altitude because it did not adequately monitor the descent. The proper operation of the flight director system and the altitude alerting system might have prevented this incident; however, as the systems were not operative, the crew was not relying on them to provide information or signals relative to the descent and level off.

The fact that the co-pilot did not reset his altimeter had no effect on this incident.

The crew of the Fokker aircraft did not contribute to nor could it have prevented this incident.

FINDINGS:

Cause Related:

1. The Boeing 767 flight crew did not adequately monitor the descent and allowed the aircraft to go below the assigned altitude of 15,000 feet which resulted in the risk of collision with the Fokker aircraft.

Other:

1. The Boeing 767 flight director system and the altitude alert system were malfunctioning.

2. The co-pilot of the Boeing 767 did not reset his altimeter to the local altimeter setting when the flight descended out of the Standard Pressure Region.

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AIR CANADA

BOEING 727 C-GAAS

HALIFAX INTERNATIONAL AIRPORT, HALIFAX,
NOVA SCOTIA

11 DECEMBER 1984

REPORT NUMBER: 84-A44048 (Incident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 2039 AST

OPERATION: Scheduled Domestic

DAMAGE: None

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	20,000	200
LAST 90 DAYS	200	200

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	7
PASSENGERS	-	-	121

HISTORY OF THE FLIGHT:

The flight, which originated in Edmonton, Alberta, had landed in Montreal, Quebec, where the first officer was replaced by a supervisory check-pilot. The supervisory pilot was to complete a scheduled annual route check on the aircraft captain. After Montreal, the flight proceeded towards Halifax, Nova Scotia, the last stop before its final destination, St. John's, Newfoundland. It was night when the flight was about to make its approach into Halifax Airport. The Halifax Automatic Terminal Information Service (ATIS) broadcast a ceiling of 200 feet broken, 300 feet overcast, a runway visual range (RVR) of 4,500 feet, a wind of 50 degrees magnetic at four knots, and it indicated that runway 06 was in use. The weather conditions, as reported, were below the company approved minimums for a back course approach on runway 06.

When the captain became aware that runway 06 was in use, he decided to delay his final decision on the choice of another runway in order to see how the weather was evolving. When the aircraft was in range and about to start its final descent, the crew asked for the latest weather which was reported as ceiling 200 feet overcast and visibility three-quarters of a mile. These conditions were still below the company minimums, and the crew requested and obtained a straight-in instrument landing system (ILS) approach on runway 15. The crew used the speed brakes to descend rapidly and to reduce airspeed for this approach, which was in line with the direct route to the airport. At the outer marker, there was still flap to be lowered, and the final pre-landing checks had to be

completed, but the aircraft was established on the localizer. When the aircraft reached 100 feet above minimums and broke out of cloud, the approach lights were observed by the supervisory pilot, who indicated that a correction to the right was required to regain the extended centre line. The heading change brought the aircraft onto the other side of the centre line. On landing, the right main landing gear touched down four to six feet to the right of the runway. The aircraft rolled for 600 to 800 feet before it was steered back onto the runway. During the manoeuvre, one runway light was broken. The aircraft airframe and engines did not sustain any damage; one tire received a small cut.

PERTINENT INFORMATION:

The aircraft captain was hand-flying the aircraft during the approach. The supervisory pilot acted as the first officer; in this position, he was to look for visual cues as the aircraft approached decision height. When he observed the approach lights on the right, he advised the captain to go right to regain the extended centre line.

The flight data recorder (FDR) indicated that the localizer tracking was maintained with only minor deviations until the aircraft was about 800 feet above ground level. Then, a 40-foot left displacement was compensated for by a five-degree heading change to the right. The aircraft then went through the localizer, and, at 600 feet above ground, it was 40 feet right of the extended centre line. The aircraft again crossed the centre line still moving to the right. The captain, realizing that the aircraft was still moving towards the right while overflying the runway, pulled the aircraft back towards the left. Realizing that he had used too much runway, the captain decided to land and touched down about 110 feet right of the centre line.

The incident took place during the allowable duty time limit for pilots.

ANALYSIS:

Examination of the FDR plot indicates that the aircraft captain made heading corrections that were excessive for the amount of lateral displacement required. The cause of the heading overcorrection by the captain was not determined. Several factors may have degraded the pilot's performance during the final approach. The initial approach had been rushed, thus reducing the time available to achieve a stabilized approach. The captain was also completing a long duty day, and his performance was being assessed by a supervisory pilot.

FINDINGS:

Cause Related:

1. The initial stages of the night ILS approach were rushed, thus reducing the time available to achieve a stabilized approach.
2. At the completion of the approach, the pilot made heading corrections that were excessive for the lateral displacement required, and the aircraft right main gear touched down to the right of the runway.
3. The pilot elected to land when the aircraft was not aligned with the runway.

Other:

-Nil-

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AIR CANADA
BOEING 727-233 C-GYNG
DORVAL AIRPORT, QUEBEC
14 JANUARY 1985

REPORT NUMBER: 85-Q54003 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1405 EST
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,073	894
LAST 90 DAYS	172	172

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	7
PASSENGERS	-	-	51

SUMMARY REPORT:

After landing at Dorval Airport, Québec, the 727 aircraft, using only the number two engine, was taxiing to the assigned gate. During the turn into the gate, the pilot was forced to stop the aircraft because of vehicular traffic in the gate area. Once the traffic cleared, the pilot resumed taxiing, and the jet blast from the 727 damaged a Saunders ST-27 aircraft parked at gate 40 to the rear of the 727.

Examination of the 727 flight data recorder revealed that when the pilot added power to resume taxiing, the number two engine was operated up to an engine pressure ratio of 1.56. At the time of the occurrence, light snow was falling and taxiway markings painted on the

Aviation Occurrence Reports

surface were hidden under a layer of snow. This layer hampered aircraft movement on the ground.

The Air Canada Flight Operations Manual leaves it to the discretion of the pilot as to whether he will taxi on one, two, or three engines and recommends that the pilot considers the type of parking manoeuvres required when making his decision. The turn into the gate is through approximately 150 degrees and, although the pilot was not anticipating having to stop during the turn, taxiing using more than one engine would have ensured lower engine peak power requirements throughout the taxiing operation. Gate arrival procedures should ensure that the gate area is kept clear during the arrival of an aircraft.

FINDINGS:

Cause Related:

1. Access to the gate area was prevented by a ground vehicle, and, as a result, the pilot was required to stop the aircraft during the turn into the gate.

2. The pilot used more power than normal on the only engine running because of the snow which hampered aircraft movement on the ground.

3. A parked Saunders aircraft was damaged by the jet blast from the taxiing 727 aircraft.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

Since this occurrence, the Air Canada Flight Operations Manual has been amended with respect to aircraft parking procedures to reflect that:

Boeing 767 aircraft scheduled to arrive at Gate One are to taxi west only of the aerodrome; and

DC-9 and Boeing 727 aircraft are to avoid higher than idle thrust during turns from the east into Gate One; Boeing 727 should not have less than two engines operating.

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AIR CANADA

MCDONNELL DOUGLAS DC-9-32 C-FTMZ

OTTAWA INTERNATIONAL AIRPORT, ONTARIO

24 FEBRUARY 1985

REPORT NUMBER: 85-O/54028 (Incident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 0835 EST

OPERATION: Scheduled Domestic

DAMAGE: None

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	9,438	3,048
LAST 90 DAYS	133	133

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	7
PASSENGERS	-	-	85

SUMMARY REPORT:

The scheduled DC-9 flight took off at 0834 from runway 07 at Ottawa Airport en route to Toronto, Ontario. Just after take-off, the crew heard a number of loud popping noises, and the control tower personnel informed the crew that they had observed flames from the exhaust of both engines. The flight continued to Toronto, and en route, the crew observed a drop in the engine pressure ratio of the number two engine. After arrival in Toronto, it was found that both engines had been damaged, and the number one engine required replacement.

The fan and compressor blades of both engines had been extensively damaged. Because of the nature and extent of the damage and the fact that it occurred to both engines, it was concluded that the damage was caused by the ingestion of ice and water.

It had rained continuously at Ottawa overnight. The weather at the time of take-off was reported as follows: cloud ceiling 500 feet overcast, visibility five miles in light rain and fog, temperature 0.2 degrees Celsius, and dew point - 1.2 degrees Celsius.

Runway 07 is 8,000 feet by 200 feet. The runway had been checked at 0530 on the morning of the incident, and a runway condition report was issued stating that the centre 175 feet of the runway was bare and wet with the remaining 25 feet wet and ice covered. A second runway condition report was issued at 0900, indicating that the centre 175 feet of the runway was 85 per cent bare and wet, with 15 per cent slush patches to a depth of one-half inch, and water at a depth of three-quarters of an inch running across the runway. The remaining 25 feet was wet and ice covered.

The Air Canada DC-9 Airplane Operating manual states that take-off must not be attempted when large pools of standing water, in excess of one-half inch deep, cover an appreciable part of the runway, or when there is wet snow or slush exceeding one-half inch deep on the runway. These limitations are with regard to aircraft take-off performance and are not linked to possible aircraft damage. The existence of one area of water three-quarters of an inch deep would not significantly affect aircraft performance.

Runways are normally inspected at least once per eight-hour shift; and, at other times, when there is or could be a significant change in the runway surface conditions, when a pilot (user) indicates an abnormal runway condition, or when there has been an incident or accident on or near the runway. Since there were no abnormalities reported by any of the crews using the runway, the airport staff was unaware of possible problems. A runway inspection was carried out after the departure of C-FTMZ because of the flames observed coming from the engine exhausts. The latest runway condition report available to the crew of the incident aircraft was the one issued at 0530. There is no record of other users advising the tower of worsening runway conditions, and the incident crew had no runway information in addition to the 0530 report.

Eleven aircraft, including three DC-9's, took off and three aircraft landed at Ottawa between 0700 and 0900. Two of the DC-9's experienced near identical engine damage on take-off, this one at 0835 and the other at 0820. Between 0900 and 1240, 18 aircraft, of which five were DC-9's, took off and 10 aircraft landed. The two DC-9's that took off before 0900 were the only ones with reported damage.

During the take-off roll, the engines ingested ice and water thrown up by the main wheels, probably during or after aircraft rotation to the take-off attitude.

The crew were not aware that there were slush and water patches on the centre portion of the runway, and it is not known whether they would have taken off or not had they had up-to-date runway information. It is known that following the issuance of the 0900 report, many aircraft crews took off and landed despite their up-to-date knowledge of runway conditions.

The crew heard unusual engine noises on take-off and they were notified that flames had been seen coming from the exhausts of both engines on take-off; there were no cockpit indications of an engine malfunction. The aircraft was landed uneventfully at Toronto; however, the noises and flames both indicated potential hazardous engine problems.

FINDINGS:

Cause Related:

1. Water and ice were ingested during the take-off roll, damaging the engines.

Other:

1. The crew continued to destination with a potential engine problem.

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AIR CANADA

MCDONNELL DOUGLAS DC-9-32 C-FTMA
OTTAWA INTERNATIONAL AIRPORT, ONTARIO
24 FEBRUARY 1985

REPORT NUMBER: 85-054029 (Incident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 0820 EST

OPERATION: Scheduled Domestic

DAMAGE: None

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,381	4,479
LAST 90 DAYS	96	96

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	7
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft departed Ottawa, Ontario from runway 07 at 0816 EST en route to Montréal, Québec. During the climb, the right-hand engine vibration monitor was fluctuating from zero to four with the vibration light illuminated. The aircraft landed uneventfully at Montreal.

The fan and compressor blades of both engines had been extensively damaged. Because of the nature and extent of the damage and the fact that it occurred to both engines, it was concluded that the damage was caused by the ingestion of ice and water.

It had rained continuously at Ottawa overnight. The weather at the time of take-off was reported as follows: cloud ceiling 500 feet overcast, visibility five miles in light rain and fog, temperature 0.2 degrees Celsius, and dew point - 1.2 degrees Celsius.

Runway 07 is 8,000 feet by 200 feet. The runway had been checked at 0530 on the morning of the incident, and a runway condition report was issued stating that the centre 175 feet of the runway was bare and wet with

Aviation Occurrence Reports

the remaining 25 feet wet and ice covered. A second runway condition report was issued at 0900, indicating that the centre 175 feet of the runway was 85 per cent bare and wet, with 15 per cent slush patches to a depth of one-half inch, and water at a depth of three-quarters of an inch running across the runway. The remaining 25 feet was wet and ice covered.

The Air Canada DC-9 Airplane Operating manual states that take-off must not be attempted when large pools of standing water, in excess of one-half inch deep, cover an appreciable part of the runway, or when there is wet snow or slush exceeding one-half inch deep on the runway. These limitations are with regard to aircraft take-off performance and are not linked to possible aircraft damage. The existence of one area of water three-quarters of an inch deep would not significantly affect aircraft performance.

Runways are normally inspected at least once per eight-hour shift; and, at other times, when there is or could be a significant change in the runway surface conditions, when a pilot (user) indicates an abnormal runway condition, or when there has been an incident or accident on or near the runway. A runway inspection was carried out after the departure of a DC-9 at 0835 because flames were observed coming from the engine exhausts. The latest runway condition report available to the crew of the incident aircraft was the one issued at 0530. There is no record of other users advising the tower of worsening runway conditions, and the incident crew had no runway information in addition to the 0530 report.

Eleven aircraft, including three DC-9's, took off and three aircraft landed at Ottawa between 0700 and 0900. Two of the DC-9's experienced near identical engine damage on take-off, this one at 0820 and the other at 0835. Between 0900 and 1240, 18 aircraft, of which five were DC-9's, took off and 10 aircraft landed. The two DC-9's that took off before 0900 were the only ones with reported damage.

During the take-off roll, the engines ingested ice and water thrown up by the main wheels, probably during or after aircraft rotation to the take-off attitude.

The crew were not aware that there were slush and water patches on the centre portion of the runway, and it is not known whether they would have taken off or not had they had up-to-date runway information. It is known that following the issuance of the 0900 report, many aircraft crews took off and landed despite their up-to-date knowledge of runway conditions.

The crew noted the high engine vibration indication and the vibration light; however, as there were no other indications of engine problems, and because the vibration

indication diminished during the climb, the crew elected to continue to Montreal.

FINDINGS:

Cause Related:

1. Water and ice were ingested during the take-off roll, damaging the engines.

Other:

-Nil-

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CP AIR

DOUGLAS DC-10-10 N 1836U
TORONTO/LESTER B. PEARSON
INTERNATIONAL AIRPORT, TORONTO,
ONTARIO
5 MARCH 1985

REPORT NUMBER: 85-054903 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1305 EST
OPERATION: Scheduled Domestic
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10,688	1,642
LAST 90 DAYS	109	109

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	15
PASSENGERS	-	-	139

SUMMARY REPORT:

The DC-10 was departing Toronto, Ontario on a scheduled flight to Calgary, Alberta. After receiving take-off clearance, the pilot increased power, and the aircraft began its take-off roll. As the throttles were advanced through 90 percent, a juddering sensation was felt by the flight crew. The number 2 engine reverser light cycled "on" then "off", and the vibration increased. The pilot rejected the take-off and shut down the number 2 engine, before returning to the ramp.

On the day prior to the incident, there had been a major snow storm, and many of the taxiways were still covered with various amounts of snow and ice. The aircraft had been parked outside during the storm and was moved into the hangar overnight. On the morning of the incident, the aircraft was taxied from the hangar

to the terminal. During the taxi, the aircraft became stuck in a snowbank, requiring high power settings on the number 2 engine to free it.

On the DC-10 aircraft, water and ice can accumulate at the base of the number 2 engine fan. As the engine fan and case drain holes are not heated, inspection of this area prior to start-up for flight is required by the aircraft maintenance manual. This inspection was not carried out.

Ice accumulated in the number 2 engine cowl area during the period that the aircraft was parked outside and when the aircraft was taxied to the terminal. On take-off, the ice was ingested, causing failure of the number 2 engine fan.

Although the written report of the engine tear-down has not yet been received, a verbal report from CP Air indicated that there was ice ingestion. This is also supported by a separate National Transportation Safety Board analysis of eight fan blades from the engine.

FINDINGS:

Cause Related:

1. The number 2 engine fan failure was caused by the ingestion of ice which had accumulated in the cowl area.
2. The number 2 engine inlet area was not inspected before start-up for snow and ice accumulation, as required by the aircraft maintenance manual.

Other:

-Nil-

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NOLISAIR INTERNATIONAL INC. (NATIONAIR CANADA)

MCDONNELL DOUGLAS DC-8-61 C-GMXB

QUEBEC AIRPORT, QUEBEC

07 MARCH 1985

REPORT NUMBER: 85-Q54022 (Incident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 2139 EST

OPERATION: International Charter

DAMAGE: None

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,125	355
LAST 90 DAYS	167	167

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	11
PASSENGERS	-	-	252

SUMMARY REPORT:

During normal climb-out, the flight engineer reported that the hydraulic fluid level had diminished. The pilot completed an emergency check-list, advised the tower controller of the situation, and requested to have emergency equipment standing by. On touchdown, when steady braking was applied, the hydraulic pressure dropped immediately to 1,500 pounds per square inch (psi) then slowly to 1,100 psi. The aircraft was brought to a stop on the runway and then towed to the ramp.

An initial inspection of the hydraulic system revealed that the loss of fluid was due to a rupture in the line to the landing gear bogie trim cylinder. A further examination of the line revealed that the outer wire braiding on the hose had failed in overload because of fatigue-generated pre-cracks in the individual wire strands. The fatigue was of a high-cycle nature and was the result of unidirectional bending loading on the individual strands. Initiation of the fatigue cracking at the surfaces of the wires did not appear to be associated with any particular stress concentration or surface discontinuity and is assumed to have occurred as a consequence of unexpected service loads. The inner braided layer had also failed in fatigue. Fatigue at both sites was a result of long time in service.

The following laboratory report was completed: LP 52/85 - Flexible Hose Bogie Trim Cylinder.

Aviation Occurrence Reports

FINDINGS:

Cause Related:

1. Hydraulic fluid was lost when the line to the landing gear bogie trim cylinder ruptured.
2. The wire braiding on the line failed in fatigue because of the long time in service.

Other:

- Nil -

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NUNASI CENTRAL AIRLINES

DOUGLAS DC-3 C-GCKE

CROLL LAKE, MANITOBA

23 MARCH 1985

REPORT NUMBER: 85-C50014 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1730 CST

OPERATION: Charter

DAMAGE: Substantial

PILOT LICENCE: Senior Commercial

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	20,622	4,100	850	600
LAST 90 DAYS	169	169	NOT REPORTED	

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	1
PASSENGERS	-	-	3

HISTORY OF THE FLIGHT:

The aircraft was on the first of several flights intended to transport building supplies, equipment, and personnel to a conservation site at Croll Lake, Manitoba. This was the first of several flights to be conducted to the site and the untested landing surface of the lake. The pilot overflew the surface of the lake to select a site for landing. A normal ski landing approach was made, and, as the aircraft touched down, the right main ski tipped downward. Before the ski could regain normal attitude, it was driven tip first into a softer drift. The right ski and landing gear assembly failed, and the aircraft yawed to the right. The left main landing gear failed as it dug into the snow. The propellers were torn from both engines as the aircraft slid to a rest on the fuselage in a slightly nose-down attitude on the lake. The co-pilot and three passengers escaped injury; however, the captain was seriously injured.

PERTINENT INFORMATION:

Failed components from the right landing gear ski were found near the initial touchdown point. Impact marks indicate that the right ski had nosed into the crusted soft drift immediately after contacting a hard-packed snow-drift. The right landing gear drag strut punctured the right wing.

At the time of the accident, dull daylight conditions consistent with high broken ceilings provided little or no contrast lighting for surface condition assessment.

The surface of the lake was snow covered, with drifts averaging two feet in depth. The drifts ranged in consistency from hard-packed to crust-covered soft snow.

ANALYSIS:

After the trailing edge of the right ski touched down on the ridge of the hard snow-drift, the nose of the ski was forced into the crusted snow-drift because it had assumed a nose-down attitude. The right ski failed in overload, and the resultant forces pushed the right main landing gear drag strut through the right wing. As the aircraft yawed, the left ski dug into the snow, causing the left landing gear/ski assembly to fail. It could not be determined why the ski assumed a nose-down attitude before striking the snow-drift.

FINDINGS:

Cause Related:

1. Surface conditions could not be accurately determined when viewed from the air.
2. The right main ski dug into the crusted snow-drift because it had assumed a nose-down attitude.
3. Forces encountered were sufficient to cause failure and displacement of the right main landing gear and strut assembly.
4. It could not be determined why the right main ski assumed a nose-down attitude before striking the crusted snow-drift.

Other:

-Nil-

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QUEBEC AIR
HAWKER SIDDELEY HS-748 C-GAPC
ILES DE LA MADELEINE, QUEBEC 40 mi NW
04 MAY 1985

REPORT NUMBER: 85-Q54047 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1545 EST
OPERATION: Regular Specific Point
DAMAGE: None
PILOT LICENCE: Airline Transport

	PILOT-IN COMMAND		CO-PILOT	
PILOT HOURS:	ALL	ON	ALL	ON
	TYPES	TYPE	TYPES	TYPE
TOTAL	6,600	4,300	4,360	1M023
LAST 90 DAYS	200	200	99	99
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	3	
PASSENGERS	-	-	22	

HISTORY OF THE FLIGHT:

The aircraft had just left Iles de la Madeleine Airport for Gaspé and was at an altitude of 8,000 feet when the co-pilot experienced difficulty in operating the elevator control. The captain decided to divert to Mont-Joli since the weather was more favourable at that airport. During the final approach, the controls began to respond, and the aircraft landed without difficulty.

PERTINENT INFORMATION:

The night before the flight, the aircraft remained parked in the open at the Iles de la Madeleine Airport and was exposed to an accumulation of approximately four inches of wet snow, accompanied by a gusting wind from the right. Before take-off, the co-pilot noted that no snow or ice accumulation was visible on the aircraft. All the controls were operated, and the control surfaces were checked visually, except for the right stabilizer and elevator as the rear door could not be opened because of a 25-knot wind gusting to 38 knots. On this type of aircraft, the stabilizer and elevator surfaces are checked from the rear doors or by using a ladder. They cannot be checked from the ground.

The temperature at the time of take-off was zero degrees Celsius; at an altitude of 8,000 feet, the co-pilot advised the captain that the elevator appeared to be jammed. The aircraft reached a cruising altitude of 10,000 feet where the temperature was minus 12 degrees Celsius. The captain decided to fly to Mont-Joli since the weather conditions there were more favourable.

On the ground, the temperature was eight degrees Celsius, and the crew noted that there was ice on the right elevator, from which water was running. A closer examination by a technician established that there was an accumulation of ice between the right stabilizer and elevator. A minor ice accumulation was also noted inside the right stabilizer.

ANALYSIS:

As a result of strong winds throughout the night preceding the flight, a quantity of wet snow accumulated on the right elevator, between the right stabilizer and elevator and inside the right stabilizer. This accumulation of wet snow was not detected during the pre-flight ground check because these parts of the aircraft were not checked.

During the climb, when the aircraft was exposed to temperatures below the freezing point, this accumulation of water and snow turned to ice and jammed the elevator. During the final approach to Mont-Joli, the elevator controls started to respond when the ice accumulation began to melt as the outside air temperature rose above the freezing point.

FINDINGS:

Caused Related:

1. The night before the flight, the aircraft was parked outside, and a quantity of wet snow accumulated between the right stabilizer and elevator and on the right elevator.
2. The wet snow accumulation was not detected during the pre-flight ground inspection, since the right stabilizer and elevator were not checked.
3. During the climb, when the aircraft was exposed to temperatures below freezing, the water and snow accumulation turned to ice and jammed the elevator.

Other:

- Nil -

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Aviation Occurrence Reports

NORCANAIR LTD.
FAIRCHILD F-27 C-FGZJ
LA RONGE, SASKATCHEWAN
13 MAY 1985

REPORT NUMBER: 85-C54010 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 CST
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	12,000	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	14

HISTORY OF THE FLIGHT:

After take-off from Stoney Rapids, when the pilot selected the landing gear up, the aircraft began to pitch up. Neither full-forward control column pressure nor full nose-down trim reduced the pitching-up tendency, but, when the flaps were retracted and the engine power settings were reduced, the controls returned to a normal functioning condition. The aircraft was returned to Stoney Rapids without further incident. A visual inspection of the aircraft and a test flight did not reveal any discrepancies, and the aircraft was prepared for departure to La Ronge.

The flight was normal; however, on descent to La Ronge, when the power was reduced, the problem reappeared. Despite full-forward control column pressure and full nose-down trim, the aircraft still attempted to climb. While the control column was being held forward, the crew felt the aircraft buffet, and once again the controls returned to a normal functioning condition. After landing at La Ronge, it was discovered that the right elevator torque tube had failed.

PERTINENT INFORMATION:

Laboratory analysis determined that the torque tube had failed circumferentially beneath the inboard attachment flange to the horizontal stabilizer. The tube failed in fatigue which initiated at the corners of the tube rivet holes. Fatigue propagated around approximately 80 per cent of the tube's circumference before final rupture took place. The fatigue initiation was associated with zones of fretting wear in and adjacent to the rivet holes.

Normal flight characteristics and unusual environmental influences which might be experienced during flight would normally affect both elevators of the aircraft at the same time. However, the left elevator was inspected and x-rayed, and there were no indications of damage similar to that found on the right elevator.

ANALYSIS:

In surveys conducted by both the manufacturer and the operator, it was conceded that this failure was an isolated instance. Fretting is a wear process that occurs when two mating surfaces under load are subjected to minute relative movement. The rivets could have been subjected to an overstress at some time, resulting in loosening of the joint which allowed fretting to occur and eventually caused fatigue initiation. It was not determined when or how an initial overstress could have occurred. The elevator torque tube failed under normal loads after being weakened by fatigue cracking.

The following laboratory report was completed:
LP 127/85 - Elevator Torque Tube Fairchild F-27, S/N 53.

FINDINGS:

Cause Related:

1. The aircraft's right elevator torque tube failed under normal loads after being weakened by fatigue cracking.

Other:

-Nil-

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WORLDWAYS CANADA LTD.
DC-8-36, C-FCPP
SUMMERSIDE, PRINCE EDWARD ISLAND
30 JUNE 1985

REPORT NUMBER: 85-A54037 (Incident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1930 ADT
OPERATION: International Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	21,500	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	10
PASSENGERS	-	-	245

SUMMARY REPORT:

The flight was en route to Athens, Greece from Toronto, Ontario via Montreal, Quebec. During the climb-out after departure from Montreal, the aircraft cabin pressure continued to climb. The aircraft was levelled off at flight level 260, and functional checks were carried out in an attempt to control the pressure. While carrying out these checks, a muffled sound was heard; the cabin pressure dropped abruptly, and the aircraft depressurized. An immediate descent was commenced, and the flight returned to Toronto without further incident.

The air conditioning ground service door was missing. The valve flapper assembly behind this door was loose, having become misaligned as a result of loose locking nuts on the screw pivots holding the check valve flapper assembly in place. This condition created an increasing pressure differential on the door until it tore off in flight, causing the cabin to depressurize. The screw pivot had been replaced 252 hours prior to the incident.

FINDINGS:

Cause Related:

1. Improperly installed locking nuts on the screw pivots of the check valve flapper assembly resulted in the air conditioning ground service door coming off the aircraft in flight, causing the aircraft cabin to depressurize.

Other:

- Nil-

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RISK OF COLLISION BETWEEN: MCDONNELL
DOUGLAS DC-9-32 C-FTLQ and BEECH B-55
BARON C-FCAO
TORONTO/LESTER B. PEARSON
INTERNATIONAL
AIRPORT, ONTARIO
22 JULY 1985
LOCAL TIME: 0848 EDT
INFORMATION SOURCE: Field Investigation

MCDONNELL DOUGLAS DC-9-32 C-FTLQ

REPORT NUMBER: 85-O/54185 (Incident)
OPERATOR: Air Canada
OPERATION: Scheduled Domestic
DAMAGE: Nil
PILOT LICENCE: Airline Transport

	PILOT-IN COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	10,000	500	1,500	50
LAST 90 DAYS	200	200	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	5
PASSENGERS	-	-	42

BEECH B-55 BARON C-FCAO

REPORT NUMBER: 85-O/54185 (Incident)
OPERATOR: Department of Transport
OPERATION: State
DAMAGE: Nil
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

Air Canada DC-9 Flight 363, after being cleared by ground control to taxi to runway 33, proceeded by the assigned routing to the threshold of the runway. Transport 982, a Beech Baron, was holding in position on runway 33, about midway along the runway, awaiting take-off clearance. The Baron was cleared for take-

Aviation Occurrence Reports

off just prior to the DC-9 changing to the tower frequency. The DC-9's change to the tower frequency and request for take-off occurred simultaneously with the Baron's crew acknowledging their clearance. The acknowledgement of clearance heard by the controller was garbled, and he reissued the take-off clearance. The pilot of the DC-9 heard all but the first words of the take-off clearance and he believed the clearance was for him. He acknowledged the clearance, advised the tower that they were rolling, and then took off.

When the controller observed that the DC-9 was rolling, the aircraft was nearing rotation, and the Baron had taken off and was ahead of the DC-9. The controller instructed the DC-9 to turn 45 degrees to the left to provide separation.

PERTINENT INFORMATION:

Runway 33 rises about 12 feet between the runway threshold and a point 4,260 feet northwest of the threshold, and then falls about 25 feet over the remainder of its length. An aircraft holding in position at the threshold of runway 33 cannot see a small aircraft holding about midway along the runway. It was not unusual for air traffic control to position more than one aircraft on a runway to take off in sequence.

ANALYSIS:

Because of the hump in the runway, the crew of the DC-9 on the threshold of runway 33 could not see the Baron in position for take-off midway along the runway. The aircraft identification in the take-off clearance reissued by the tower to the Baron was not heard by the DC-9 pilot as he was transmitting to request his take-off clearance. The DC-9 pilot assumed that a clearance to take off on runway 33 could only apply to his aircraft since he was the first one to go on the threshold and no other aircraft was visible on the runway. The DC-9 pilot made a call on the tower frequency to advise that they were rolling; however, this call did not trigger a reaction by the controller. Because the controller noticed the DC-9 when it was nearing rotation, he decided to instruct the DC-9 pilot to turn left after take-off instead of requesting a rejected take-off.

FINDINGS:

Cause Related:

1. A hump in the runway prevented the DC-9 crew from seeing the Baron awaiting take-off clearance midway along the runway.

2. The DC-9 crew assumed they were issued a take-off clearance although they did not hear their call sign.

3. The controller did not react immediately when he heard the DC-9 crew advise that they were rolling, although no take-off clearance had been issued to them.

Other:

-Nil-

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LABRADOR AIRWAYS LIMITED
SAUNDERS ST27 C-FLOL
ST. JOHN'S, NEWFOUNDLAND
2 AUGUST 1985

REPORT NUMBER: 85-A54048 (Incident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 0740 NDT

OPERATION: Non-Regular Specific Point

DAMAGE: Minor

PILOT LICENCE: Airline Transport

PILOT HOURS:	PILOT-IN COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	4,000	1,500	Unknown	Unknown
LAST 90 DAYS	250	240	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	2

SUMMARY REPORT:

Shortly after take-off from runway 11 at St. John's Airport, and at an altitude of 1,500 feet above sea level (asl), the aircraft encountered severe turbulence. The pilot-in-command briefly lost control as the aircraft underwent extreme altitude and altitudinal changes. The effort of both pilots was required to regain control and level the aircraft. The flight was then diverted to Gander, Newfoundland where a landing was carried out without further incident. The skin of the rear luggage compartment was punctured by the tail support stand which was stored, but not secured, in that area.

The forecast called for strong winds gusting to 45 knots and the possibility of the presence of embedded towering cumulus and cumulonimbus cloud formations. The combined effect of strong winds and rough terrain was expected to create moderate mechanical turbulence below 3,000 feet and moderate to severe turbulence was

expected in the vicinity of well-developed convective type cloud.

Another aircraft while on approach to runway 11 reported turbulence; it also reported a 40-knot tailwind from 7,400 feet to 5,000 feet that changed into a 60-knot headwind component at about 1,300 feet, as it was approaching the outer marker. The crew of the Saunders had received a pre-flight weather briefing and was aware of the possibility of a turbulent flight; however they had not anticipated the severity of the turbulence that was encountered.

An area weather report which was taken after the occurrence showed that the speed of the wind at 3,000 feet over St. John's was 9 knots, while the surface wind was gusting to 45 knots. This condition created a potential shear of 12 knots per 1,000 feet, which the aircraft could have encountered following take-off. The combined effect of convective type cloud, strong gusty winds, rough terrain and vertical wind shear resulted in severe turbulence.

Had the tail support stand been secured it would not have caused any damage.

FINDINGS:

Cause Related:

1. The crew lost attitudinal and altitude control when severe turbulence and wind shear were encountered.
2. The turbulence was the result of convective type cloud, strong gusty surface winds, rough terrain and a strong vertical wind shear.

Other:

1. The tail support stand stowed in the rear baggage compartment was not secured.

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RISK OF COLLISION BETWEEN: CONVAIR 580
C-GGWI and PIPER PA-31T CHEYENNE C-GHSI
TORONTO/LESTER B. PEARSON
INTERNATIONAL
AIRPORT, ONTARIO
09 AUGUST 1985
LOCAL TIME: 2000 EDT
INFORMATION SOURCE: Field Investigation

CONVAIR 580 C-GGWI

REPORT NUMBER: 85-O/54186 (Incident)
OPERATOR: Air Ontario Limited
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

	PILOT-IN COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	4	
PASSENGERS	-	-	2	

PIPER PA-31T CHEYENNE C-GHSI

REPORT NUMBER: 85-O/54186 (Incident)
OPERATOR: Voyageur Airways Limited
OPERATION: Commercial Non-Revenue
DAMAGE: None
PILOT LICENCE: N/A

	PILOT-IN COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	2	
PASSENGERS	-	-	-	

HISTORY OF THE FLIGHT:

C-GGWI, a passenger flight from London, Ontario, operating as Air Ontario Flight 820, was on arrival at Toronto operating under instrument flight rules (IFR). The flight was at 4,000 feet under radar vectors on a left-

Aviation Occurrence Reports

hand downwind for an instrument landing system (ILS) approach to runway 15. C-GHSL, operating as Voyageur Flight 104, was arriving at Toronto operating under visual flight rules (VFR) and was descending from 11,500 feet for an approach to runway 06 Left. The near miss occurred in Class C controlled airspace. Both crews took evasive action. Flight 820 descended approximately 100 feet, and Flight 104, already in a descent, turned left and passed Flight 820 on the right side.

PERTINENT INFORMATION:

Flight 820 had established communications with Toronto arrival and was being radar vectored for the approach. The next conversation with Flight 820 occurred when the arrival controller advised the crew that there was VFR traffic at twelve-thirty, three miles, opposite direction, indicating 4,600 feet on the transponder altitude readout. The crew advised they had the traffic in sight, at which time the controller advised the crew that the transponder readout was now 4,300 feet. The crew replied that the traffic was taking evasive action.

Flight 104 had established communications with the Toronto VFR terminal controller and advised the controller that they were 35 miles north at 11,500 feet for landing at Toronto. The controller assigned a transponder code and advised the crew that the arrival runway would be runway 06 Left. There was no further communication with Flight 104 until after the incident with Flight 820.

During this period, there was a non-transponder-equipped aircraft operating under VFR conditions passing north of Toronto at 6,500 feet through the approach sector of runway 15. As well, the controllers were changing positions as part of their regular shift rotation. When a controller takes over a position from another controller, the new controller is briefed on the traffic status by the controller being relieved.

ANALYSIS:

Both flight crews involved were operating their aircraft in accordance with instructions issued by air traffic services controllers. Both flight crews were familiar with procedures at Toronto, and the controllers were familiar with the flights as the aircraft operate into Toronto on a regular basis. Air traffic in the terminal area at the time was assessed as heavy IFR arrivals and moderate to light VFR traffic. This situation was complicated by the non-transponder-equipped aircraft passing north of Toronto at 6,500 feet above sea level through the approach section of runway 15. Two arrival radar positions were in operation to handle the IFR arrivals.

When the Voyageur flight contacted the VFR terminal controller for clearance into the Class C airspace, the flight was beyond the VFR controller's radar range. The controller assigned a transponder code to the flight and advised the flight crew that they would be landing on runway 06 Left; however, he did not recall observing the flight on his radar scope prior to being relieved from the position by another controller. During the traffic briefing to the replacement controller, the Voyageur flight was omitted. Most of the briefing concentrated on the VFR traffic passing through the approach sector to runway 15. Because there was a possible conflict to both arrival and departure aircraft proceeding northwest bound off Toronto, the replacement controller was displaying all traffic on his radar screen after taking over the position. This action probably resulted in the Voyageur flight not being observed. Since he had not been briefed about the Voyageur flight, the replacement controller was not looking for it on his radar screen.

The controller initially working the Voyageur flight did not have any backup means to remind him that the flight was on his frequency, except for visual reference of the tag information on the radar screen.

FINDINGS:

Cause Related:

1. During a VFR controller position-change briefing, the replacement VFR controller was not informed about the VFR aircraft and, therefore, was unaware that the VFR aircraft was under his traffic control.

2. A near miss incident occurred between two arriving aircraft, one operating under IFR, and the other operating under VFR, in Class C controlled airspace.

Other:

-Nil-

→ → → → →

RISK OF COLLISION BETWEEN: HAWKER
SIDDELEY HS748-2 C-GQWO and WESTWIND
C-GDOC
TORONTO/LESTER B. PEARSON
INTERNATIONAL AIRPORT, ONTARIO
15 AUGUST 1985
LOCAL TIME: 0704 EDT
INFORMATION SOURCE: Field Investigation

HAWKER SIDDELEY HS748-2 C-GQWO

REPORT NUMBER: 85-O/54188 (Incident)
OPERATOR: Austin Airways
OPERATION: Regular Specific Point
DAMAGE: None
PILOT LICENCE: Airline Transport

	PILOT-IN COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	11,000	4,700	6,000	2,200
LAST 90 DAYS	260	260	225	225
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	4	
PASSENGERS	-	-	23	

WESTWIND C-GDOC

REPORT NUMBER: 85-O/54188 (Incident)
OPERATOR: N/A
OPERATION: N/A
DAMAGE: None
PILOT LICENCE: N/A

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	N/A	N/A	
LAST 90 DAYS	N/A	N/A	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

HISTORY OF THE FLIGHT:

Austin Airways Flight 241, a HS748, was operating as a regularly scheduled flight from the Toronto/Lester B. Pearson International Airport to the Marathon Airport, Ontario. The flight had departed from Terminal 2 and taxied to runway 33 via taxiways Romeo 4 and Victor. Taxiway Victor intersects runway 33 in the vicinity of the threshold. When the aircraft was on taxiway Victor,

Austin Flight 241 changed to the Toronto tower radio frequency to inform the controller of their position, and this radio call was received and acknowledged by the tower.

After the take-off of an aircraft from runway 33, the crew of Skycharter 251, a Learjet, which was holding short of runway 33 on taxiway Hotel, requested their take-off sequence and were advised they were the next to go. Taxiway Hotel is located about midway along the runway. At this time, Austin 241 was cleared to taxi to position on runway 33 and wait in position for take-off clearance. Austin 241 acknowledged this clearance, taxied onto runway 33, and held in position near the threshold of the runway.

After Austin 241 was cleared to position, Skycharter 251 was also cleared to position on runway 33. When Skycharter 251 entered the runway from taxiway Hotel, and held in position, the aircraft was about 5,000 feet ahead of Austin 241.

After a short delay to allow other traffic to cross runway 33, a take-off clearance was issued to Skycharter 251. Following this clearance, a partially garbled transmission ending with the words "two forty-one is cleared to go" was heard on the frequency. The tower controller then cleared a Westwind holding on taxiway Hotel to taxi to position on runway 33 behind Skycharter 251. The controller was watching the Westwind moving to position when his assistant called to his attention the fact that Austin 241 had started its take-off roll.

Realizing that Austin 241 was taking off without proper clearance and that a collision with the Westwind was possible, the tower controller instructed Austin 241 to reject the take-off. Austin 241 complied with this instruction and came to a stop before reaching taxiway Hotel.

PERTINENT INFORMATION:

Runway 33 rises about 12 feet between the runway threshold and a point 4,260 feet northwest of the threshold, and then falls about 25 feet over the remainder of its length. Taxiway Hotel is located northwest of the highest point on the runway, and the pilot of an aircraft holding in position at the threshold of runway 33 cannot see an aircraft the size of a small executive jet holding in position on the runway adjacent to the entrance of taxiway Hotel. It is not unusual for air traffic control (ATC) to position more than one aircraft on a runway to take off in sequence.

All clearances issued by the tower to Austin 241 were prefixed with the word Austin, and all clearances to

Aviation Occurrence Reports

Skycharter 251 were prefixed with the word Skycharter, as required by ATC operating procedures.

The crew of Austin 241 was required by company procedure to monitor a radio frequency used by Air Canada dispatch in addition to the ATC frequencies while on the ground. There was no recording available which would have indicated whether there were transmissions on the Air Canada frequency which may have garbled or confused calls from ATC.

The ATC tape recording does not record all that is heard by the pilot, but records what is heard by the controller, and what is said by the controller. Whenever the controller transmits, all other transmissions on that frequency are muted on the tape recording. The take-off clearance was "Skycharter two five one cleared for take-off three three airborne one twenty eight eight." This clearance was acknowledged first by a squeal indicating two or more simultaneous transmissions and then "two forty-one is cleared to go."

ANALYSIS:

Because of the rise in the runway, the crew of Austin 241 could not see the Skycharter 251 Learjet in position at the taxiway Hotel intersection. They believed they had heard a take-off clearance issued to them when the clearance was actually for Skycharter 251. The transmission from the tower may have been cut off by another aircraft transmitting on the tower frequency. The evidence of such an interference is not available because only the controller's voice is recorded on the tower tapes when he transmits on the tower frequency. It is also possible that a communication from the Air Canada dispatch on the company frequency interfered with the reception of the ATC transmissions. There is also no evidence of such an interference because these communications are not recorded. The tower controller did not notice that the take-off clearance was read back by an aircraft to which it was not directed, and cleared another aircraft holding on taxiway Hotel to taxi onto the runway. This aircraft also was not visible to the crew of Austin 241.

FINDINGS:

Cause Related:

1. Aircraft taxiing to or holding in position were not visible to the crew of Austin 241 due to a rise of the runway.
2. The Austin 241 crew believed they had heard a take-off clearance issued to them when the clearance was actually for Skycharter 251.

3. The tower controller did not notice that the take-off clearance was read back by an aircraft to which it was not directed.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

The Canadian Aviation Safety Board (CASB) analysed the circumstances of this occurrence in conjunction with those of three similar events and determined that the aircrew, who inadvertently accepted the take-off clearance, did not have visual contact with the other aircraft involved, nor were they aware of it being in position for take-off. During the busy pre-take-off phase, these crews subsequently accepted the take-off clearance for another aircraft as their own.

Such breakdowns in the information transfer process are not unusual. Due to hearing expectancy, there is a tendency for crew awaiting take-off instructions to erroneously accept another aircraft's take-off clearance, particularly during situations of simultaneous line-ups.

In order to prevent a recurrence similar to this incident, the CASB recommended that:

The Department of Transport reconsider the air traffic control procedures used during simultaneous line-up of aircraft for sequential take-offs to ensure that adequate safeguards are incorporated.

CASB 87-16

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RISK OF COLLISION BETWEEN: DE HAVILLAND
DASH 7 C-GFEL and CESSNA T210G
CENTURION C-GFYK
VANCOUVER INTERNATIONAL AIRPORT,
VANCOUVER, BRITISH COLUMBIA
24 SEPTEMBER 1985
LOCAL TIME: 1308 PDT
INFORMATION SOURCE: Field Investigation

DE HAVILLAND DASH 7 C-GFEL

REPORT NUMBER: 85-P54046 (Incident)
OPERATOR: Air B.C.
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

	PILOT-IN COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	12,000	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	4	
PASSENGERS	-	-	-	

CESSNA T210G CENTURION C-GFYK

REPORT NUMBER: 85-P54046 (Incident)
OPERATOR: Mainline Roofing
OPERATION: Private Company Business
DAMAGE: None
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	1,900	20	
LAST 90 DAYS	N/A	N/A	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

HISTORY OF THE FLIGHT:

Runways 26 and 12 were in use for departures when the Dash 7 was cleared to line up and hold on runway 12. Twenty seconds later, the Cessna 210 was cleared to line up and hold on runway 26. The pilot of the Cessna 210 acknowledged the clearance, lined up, and stopped on the runway. The Dash 7 was subsequently cleared for take-off on runway 12. The crew acknowledged the

clearance and called "rolling." Twenty seconds later, the tower controller observed the Cessna 210 taking off from runway 26 and directed the pilot to start an immediate right turn. The pilot, who had the Dash 7 in sight at this time, had already commenced the turn and passed behind the Dash 7.

PERTINENT INFORMATION:

While awaiting take-off clearance, the Cessna 210 pilot was positioned behind another aircraft which subsequently received take-off clearance and departed. A second aircraft was positioned on the runway behind the Cessna 210, and a third was on final approach to the runway.

Immediately after the Dash 7 crew acknowledged their take-off clearance, the control tower made a transmission to another aircraft. There was a five- to seven-second period of continuous radio transmissions following the Dash 7's take-off clearance. The pilot of the Cessna 210 reportedly acknowledged his assumed take-off clearance; however, no recorded radio transmissions were received by the tower.

The Vancouver runway layout relative to the location of the tower does not allow simultaneous visual monitoring of runways 12 and 26. When departures from runway 12 are being visually monitored by a controller, the departure path from the threshold of runway 26 is behind him.

ANALYSIS:

When the aircraft ahead of the Cessna 210 departed, it is probable that the pilot, with an aircraft behind him and another on final approach, felt pressured into expediting his take-off. Pilots that are positioned behind another aircraft do not expect take-off clearance. In this instance, the pilot was anticipating take-off clearance as soon as the aircraft ahead departed. He had mentally conditioned himself that the next take-off clearance would be for him. When the take-off clearance was transmitted to the Dash 7, the Cessna 210 pilot assumed it was intended for him and proceeded to take off. The pilot reportedly acknowledged this assumed clearance, but, because the tower was transmitting simultaneously, his radio transmission was neither heard nor recorded. The tower did not respond to, or query, the Cessna 210 pilot's acknowledgement of take-off clearance which reinforced the pilot's assumption that the take-off clearance was directed toward him.

When runways 26 and 12 are in use, the tower controller concentrates his attention on the specific runway being used. The use of two runways allows the control-

Aviation Occurrence Reports

ler to line up aircraft on one runway while departing aircraft on the other, and thus move a greater number of aircraft. The controller bases the aircraft movement activities on instructions passed to and acknowledged by aircraft under his control.

In this instance, the pilot of the Cessna 210 did not follow instructions, and he proceeded to take off without clearance. Because the controller was not able to simultaneously monitor both runways 12 and 26, the unauthorized take-off was not detected until both aircraft were in a risk of collision situation.

FINDINGS:

Cause Related:

1. The Cessna 210 pilot departed without receiving take-off clearance from the tower, and, as a result, his flight path conflicted with a departing Dash 7.

Other:

1. The tower controller was unable to adequately monitor runways 12 and 26 simultaneously.

SAFETY ACTION:

Action Taken:

The Canadian Aviation Safety Board (CASB) analysed the circumstances of this occurrence in conjunction with those of three similar events and determined that the aircrew, who inadvertently accepted the take-off clearance, did not have visual contact with the other aircraft involved, nor were they aware of it being in position for take-off. During the busy pre-take-off phase, these crews subsequently accepted the take-off clearance for another aircraft as their own.

Such breakdowns in the information transfer process are not unusual. Due to hearing expectancy, there is a tendency for crew awaiting take-off instructions to erroneously accept another aircraft's take-off clearance, particularly during situations of simultaneous line-ups.

In order to prevent a recurrence similar to this incident, the CASB recommended that:

The Department of Transport reconsider the air traffic control procedures used during simultaneous line-up of aircraft for sequential take-offs to ensure that adequate safeguards are incorporated.

CASB 87-16

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PROPAIR INCORPORATED
DE HAVILLAND DHC-3 C-FAON
CHEVERY AIRPORT, QUÉBEC
02 JANUARY 1984

REPORT NUMBER: 84-Q40001 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 0700 EST

OPERATION: Charter

DAMAGE: Substantial

PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,536	15
LAST 90 DAYS	120	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The ski/wheel equipped aircraft was landing on wheels and, on touchdown, it skidded for fifty feet on the bare, dry runway. The aircraft almost nosed over and then fell back heavily onto its tail.

The night before, the pilot had parked the aircraft and placed poles under the skis to prevent them from freezing to the snow. He then raised the wheels to the stowed position and set the parking brake. The next morning, he took off from a snow-covered surface using the skis, and he did not lower the wheels and release the parking brake until just prior to landing on a hard surface runway.

The investigation revealed that, because of the cold temperatures, the brakes were frozen. Because of this and the fact that the wheels were not used on take-off, the brakes did not release fully when the pilot released the parking brake. On touchdown, the partially locked brakes caused the wheels to skid, and, as a result, the aircraft almost nosed over on the runway.

FINDINGS:

Cause Related:

1. Because the pilot had set the parking brake overnight and because of the low temperatures, the brakes froze in the locked position.

2. When the pilot released the parking brake prior to landing, the frozen brakes did not release completely, and the aircraft almost nosed over during the landing roll.

Other:
-Nil-

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BRITTEN NORMAN BN2A27 C-GTCL
SHEEP CREEK STRIP, YUKON
25 APRIL 1984

REPORT NUMBER: 84-W40027 (Accident)
INFORMATION SOURCE:
LOCAL TIME: 1720 PST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3800	600
LAST 90 DAYS	107	77

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot circled over the airstrip to assess the winds and decided to land from north to south. During the approach with full flap, the pilot noted the wind was gusty and variable. On final approach, the aircraft began to sink rapidly, so he applied power immediately; however, the aircraft struck rough terrain about 160 feet short of the runway.

The private strip had a cliff dropping down to Sheep Creek on the south end while the terrain at the other end was very rough as was the strip surface. Although there was a windsock located near the south end, the winds were quite variable, because the strip was located in mountainous terrain at the junction of a creek and a river.

It could not be established with certainty whether a wind shear existed; however, it is likely the wind conditions contributed to the accident.

FINDINGS:

Cause Related:

1. The pilot undershot the runway.
2. The pilot applied improper compensation for the rough wind conditions.

Other:
-NIL-

AIR DORVAL LTD.
PIPER PA23-250 AZTEC CF-UCI
KANGIRSUK, QUÉBEC
19 SEPTEMBER 1984

REPORT NUMBER: 84-Q40074 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1404 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,125	120
LAST 90 DAYS	225	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft was landing on runway 22 at Kangirsuk, Québec in a strong cross-wind from the left. The aircraft touched down 100 feet down the runway and began to skid to the right. The pilot added power and initiated a go-around. He then reduced power and applied brakes; however, the aircraft overran the runway and came to rest in a shallow depression.

The gravel runway is 1,255 feet long by 90 feet wide. At the time of the accident, the runway was snow covered, and the braking action was poor. Due to natural soil erosion, runway 22 has a noticeable lateral downslope from left to right. The wind indicator, located halfway down the runway, was in a dilapidated condition and of little value.

In order to compensate for the gusty wind conditions, the pilot flew the approach at an airspeed of 80 to 85 mph, instead of the normal airspeed of 72 mph. Full flap was also selected. The maximum recommended cross-wind limit for this aircraft type is about 12 mph. The wind at the time of this occurrence was estimated at 23 to 29 mph at 90 degrees to the runway and may have been even stronger as weather stations in the area were reporting winds of 29 to 35 mph.

With the aircraft in the full-flap configuration, the pilots' operating manual gives a landing distance on a paved surface of 1,175 feet at an approach speed of 72 mph. The manual also recommends a full-flap setting for short-field landings; however, it qualifies this recommendation by stating that in high-wind conditions, par-

Aviation Occurrence Reports

ticularly strong cross-winds, it may be desirable to use a one-half or zero flap setting and a higher than normal approach speed.

It was also established that, on the day of the occurrence, the main local air carrier which utilizes a specialized bush aeroplane had cancelled all flights in the region because of the weather. The occurrence aircraft was flown by a pilot with very limited experience in sub-arctic areas.

In conditions of no wind and dry surface, this aircraft type could be landed on this runway; however, even then, there would only be a very slim margin for error. With the combination of a snow-covered runway, a strong cross-wind, and a higher than normal approach speed, it would have been extremely difficult if not impossible to stop the aircraft on the available runway. In addition, the indecision on the part of the pilot as to whether he would overshoot or not would have increased the landing roll considerably. The aircraft was dispatched by the company's flight operations at a time when Weather and runway conditions would make a safe landing at destination unlikely.

FINDINGS:

Cause Related:

1. The pilot attempted a landing at an aerodrome where the runway surface condition and the surface wind were unsuitable for the operation of the aircraft.
2. On landing, the pilot's indecision on whether to overshoot or not increased the landing roll considerably, and the aircraft overran the runway.
3. The aircraft was dispatched by the company's flight operations at a time when weather and runway conditions made a safe landing at destination unlikely.

Other:

- Nil -

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RISK OF COLLISION BETWEEN: CESSNA 172P
C-GQLY and DE HAVILLAND DASH 7
(AIRCOACH 519)
VICTORIA INTERNATIONAL AIRPORT,
BRITISH COLUMBIA
02 JANUARY 1985
LOCAL TIME: 1520 PST
INFORMATION SOURCE: Field Investigation

CESSNA 172P C-GQLY

REPORT NUMBER: 85-P54002 (Incident)
OPERATOR: Altair Aviation Ltd.
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	Not Available
PASSENGERS	-	-	Not Available

DASH 7 AIRCOACH 519

REPORT NUMBER: 85-P54002 (Incident)
OPERATION: Unknown
DAMAGE: None
PILOT LICENCE: Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	Not Available
PASSENGERS	-	-	Not Available

HISTORY OF THE FLIGHT:

The Cessna 172 had been taxiing to runway 31 at Victoria Airport for a visual flight rules (VFR) flight to Pitt Meadows, British Columbia. When the pilot was ready for take-off, he called Victoria Tower Two on frequency 119.1 megahertz (MHz) for take-off clearance. Tower Two replied, "Aircraft for departure, contact Tower 119.7." The pilot did not receive the first part of the transmission and asked again for take-off clearance. Tower Two replied, "Quebec Lima Yankee, contact tower 119.7 for departure." After this transmission, the Cessna 172 took off without take-off clearance while a DASH 7 was on final approach to runway 20. The DASH 7 overshoot and landed on runway 26, and the Cessna continued as planned to Pitt Meadows.

PERTINENT INFORMATION:

Tower control at Victoria is divided, with a controller designated Victoria Tower operating on frequency 119.7 MHz, and a controller designated Victoria Tower Two operating on frequency 119.1 MHz. Victoria Tower controls all traffic within three nautical miles of the airport to an altitude of 1,500 feet above ground level, and Victoria Tower Two is responsible for all visual flight rules (VFR) traffic outside this area but within the Victoria Class 'C' airspace. Both positions are referred to by radio as Victoria Tower.

Victoria tower frequencies were published in a number of publications, none of which explained the use of the frequencies, nor how the Victoria PCZ operated. Both published frequencies were "tower", and there was no means of associating a frequency with either a control or an advisory function. Frequencies are often listed in aeronautical publications in order of numerical value starting with the lowest number. The primary frequency, therefore, is not necessarily the first one listed.

After the pilot requested take-off clearance on 119.1 MHz for the first time, he only heard "departure contact tower 119.7" and assumed he had missed the take-off clearance. He again asked for take-off clearance and heard "Quebec Lima Yankee contact tower on 119.7 for departure." He concluded from the tone of the transmission and from the phrase "for departure" that he had received take-off clearance and that he should contact the tower on 119.7 MHz after take-off. The pilot noted the DASH 7 but assumed the tower controller had provided adequate separation. Airport control, on 119.7 MHz, called for QLY to stop, then realizing QLY was on frequency 119.1 MHz, the controller advised the DASH 7 of the situation, and the DASH 7 overshot.

The pilot had 4,200 hours flying time and had heard many transmissions such as "departure contact tower 119.7", and "contact tower on 119.7 for (on) departure" as departure instructions following take-off clearance.

ANALYSIS:

The Cessna 172 pilot assumed that 119.1 MHz, the first Victoria Tower frequency listed in the publications, was the primary frequency since nothing indicated otherwise. Although the pilot was never cleared for take-off, he assumed that he had been because he misinterpreted an instruction to change frequency to obtain a take-off clearance for a departure instruction which normally follows a take-off clearance.

FINDINGS:

Cause Related:

1. The pilot of the Cessna 172 took off without having received take-off clearance, forcing the DASH 7 to overshoot in order to maintain safe separation.
2. The pilot misinterpreted the tower controller's instructions.
3. There was no published information, readily available to the pilot, concerning usage of Victoria Tower frequencies.

Other:

1. The Victoria Tower Two controller was not explicit in his instructions, especially during his transmission in response to the pilot's second request for take-off clearance.

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NUNASI CENTRAL
DE HAVILLAND DHC-3 C-FMEL
RED LAKE, ONTARIO
15 JANUARY 1985

REPORT NUMBER: 85-C50005 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1050 CST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	18,000	1,000
LAST 90 DAYS	60	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

After the wheel/ski-equipped aircraft was loaded and the three passengers boarded, the pilot took off from the Red Lake ice strip. Shortly after lift-off, when the power was reduced to climb, the aircraft pitched up uncommanded. The pilot pushed the control column forward and started to trim nose-down but nothing happened. He retracted the flaps to the climb position, and as the aircraft approached the stall speed, he pulled the power off. The pilot was able to keep the wings level as the aircraft fell, and just before the aircraft hit the runway, he applied full power. The aircraft struck the runway in a nose-down swings-level attitude. Two of the three

Aviation Occurrence Reports

propeller blades sheared off, and the main landing gear spread outwards as the gear struts were driven upward into the fuselage. The aircraft then slid 300 feet before coming to a stop.

The investigation revealed that the C of G at take-off was about four inches past the aft limit. The pilot had experienced a similar pitch-up on the previous day, but he had been able to control the aircraft with elevator and trim input. When he landed at his destination, the pilot discovered approximately 600 pounds of canned goods in the rear section of the aircraft. He had not been aware, nor was he advised that the canned goods had been placed there. On the return flight the aircraft performed normally. A weight and balance sheet had not been completed for this flight, nor had one been completed for the accident flight.

In view of the uncommanded pitch-up after lift-off, the investigation concentrated on the possible failure of a primary flight control component. Prior to disassembly at the accident site, the aircraft was examined for any component failure, and two more examinations were conducted following disassembly. No evidence of control failure or jamming was found.

A review of previous DHC-3 accidents revealed that there had been one accident where the C of G exceeded the aft limits by 11.5 inches. Following this accident, the manufacturer calculated that the DHC-3 would run out of elevator control when the C of G is four inches aft of the rear limit.

No evidence was found to indicate that any aircraft component malfunctioned or failed. The available evidence shows that the C of G was at a point aft of the rear limit and created an unstable situation which the pilot could not control.

FINDINGS:

Cause Related:

1. The aircraft pitched up uncommanded after lift-off because the C of G was aft of the rear limit.
2. Weight and balance calculations had not been completed prior to the flight.

Other:

- Nil -

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AIR SATELLITE

CESSNA 404 C-GZJQ

SEPT-ILES AIRPORT, QUEBEC

07 FEBRUARY 1985

REPORT NUMBER: 85-Q54007 (Incident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1850 EST

OPERATION: Regular Specific Point

DAMAGE: None

PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,400	1,800
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot switched from Montreal peripheral frequency to contact the tower at his destination, the Sept-Iles Airport. During the initial contact, the tower controller instructed him to make a circuit to approach runway 31 and report south of the tower. The pilot reported at the point indicated and, two minutes later, was cleared by the controller to land on runway 27; no change of runway was mentioned. The pilot continued his approach to runway 31. While on his final approach to runway 31, the pilot told the tower that there was a vehicle on the runway. The controller then reminded the pilot that he was not cleared for runway 31, but for runway 27. The pilot executed an overshoot, and the controller cleared him to make a wide right turn in order to come back in and line up on runway 27.

When the pilot contacted the tower, two aircraft were on final for runway 31, while other aircraft were headed for runway 27. Although the controller referred to runway 31 when the pilot called, he intended to say runway 27. The controller's first statement to the pilot that he should use runway 27 rather than 31 came when the aircraft was either on final or almost on final. Contrary to current practice, the pilot did not read back the clearance to land on 27. A support column in the middle of the Sept-Iles tower control room prevents controllers at their work stations from seeing aircraft moving in certain sectors, especially aircraft south of the tower.

During the initial contact, the controller, for a reason not determined, made a mistake when he gave the pilot runway 31. Because of the position of the column, the aircraft's position and direction when it was on the downwind leg south of the tower could not be observed by the controller. When the pilot was cleared to land, he

did not realize that the clearance was for runway 27 rather than runway 31; his attention had not been drawn to this because he did not check the clearance and did not read back the runway number and because the controller did not advise that a change of runway was involved.

FINDINGS:

Cause Related:

1. During the initial contact, the controller indicated runway 31 rather than runway 27 to the pilot.

2. Because of the position of the central column in the tower, the controller was unable to see the aircraft's position and direction south of the tower.

3. While on final or almost on final for runway 31, the pilot did not realize that the controller was clearing him to land on runway 27; he continued his approach until he saw a vehicle on the runway.

Other:

-Nil-

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NORTH COAST AIR SERVICES LTD.
FAIRCHILD F-11-2 C-FEIM
SEAL COVE, BRITISH COLUMBIA 1/2 mi W
14 FEBRUARY 1985

REPORT NUMBER: 85-P50003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1305 PST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,750	250
LAST 90 DAYS	225	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

Shortly after taking off from the water near Seal Cove, British Columbia, the aircraft encountered severe turbulence. Deciding to land rather than continue in the turbulence, the pilot turned left in an attempt to reach smoother water. During the turn, the aircraft descended uncontrollably until it struck the water even though full

power was applied. On impact, the right float was torn off; the aircraft bounced into the air, and the left float was torn off on the second impact. The aircraft settled onto the water and started to sink. The occupants escaped uninjured and were rescued by boat a few minutes later.

The weather recorded at Prince Rupert Airport, seven miles west of Seal Cove, at 1500 was as follows: scattered cloud at 1,200 feet, broken cloud at 2,200 feet and 9,000 feet; temperature 7.8 degrees Celsius; wind from 150 degrees true at 25 gusting to 34 knots; and visibility 15 miles. The pilot was aware of the wind conditions, and, prior to the accident flight, many of the company's flights had been cancelled because of the high winds. A company directive states that, under strong southeasterly wind conditions, turbulence may be encountered in Prince Rupert Harbour (just outside of Seal Cove). The area is surrounded by mountains that can induce mechanical turbulence.

The aircraft sank in 200 feet of water but was recovered and examined. No defects or other discrepancies not related to the impact were found. The aircraft was functioning normally prior to the accident, and the weight and centre of gravity were within normal limits. The company employs a pilot self-dispatch system, which requires that the pilots ensure loading data are correct and that conditions for the flights are suitable.

The pilot did not brief the passengers on the use of the life-jackets as required by company policy. They did not know how to use the carbon dioxide inflation system, and one passenger could not don his life-jacket. The passengers were not wearing the life-jackets at the time of the accident, nor were they required to by regulations.

The pilot attempted to fly in conditions that were unsuitable for safe flight. The reason for the inability of the aircraft to remain flying is not clear. The strong winds may have produced severe downdrafts, or the pilot may have flown at an airspeed that was not high enough to compensate for the gusty wind, and the aircraft stalled. The climb performance of the aircraft would also have been reduced during the turn.

FINDINGS:

Cause Related:

1. The pilot attempted to fly the aircraft in wind and turbulence conditions that were unsuitable for safe flight.

2. The aircraft descended uncontrollably for undetermined reasons and struck the water.

Aviation Occurrence Reports

Other:

1. The passengers were not briefed on the use of the life-jackets, as required by company policy.

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RISK OF COLLISION BETWEEN: BOEING 767
C-GAUS and PIPER PA-31 NAVAJO C-GAYY
CALGARY, ALBERTA
14 FEBRUARY 1985
LOCAL TIME: 1645 MST
INFORMATION SOURCE: Field Investigation

BOEING 767 C-GAUS

REPORT NUMBER: 85-W54012 (Incident)
OPERATOR: Air Canada
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

	CAPTAIN		FIRST OFFICER	
PILOT HOURS:	ALL	ON	ALL	ON
	TYPES	TYPE	TYPES	TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	9	
PASSENGERS	-	-	N/A	

PIPER PA-31 NAVAJO C-GAYY

REPORT NUMBER: 85-W54012 (Incident)
OPERATOR: Angus Aviation Ltd.
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	N/A	N/A	
LAST 90 DAYS	N/A	N/A	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The Piper Navajo (GAYY) was on a flight from Fort Macleod to Edmonton. An instrument flight rules (IFR) flight plan had been filed for 8,000 feet direct Calgary, Alpha 2 to Edmonton. The pilot contacted Lethbridge

on climb-out from Fort Macleod and was cleared as filed. At 1615, Edmonton advised of heavy turbulence reported between 7,000 and 14,000 feet and agreed to a request from the pilot to maintain 6,000 feet. At 1628, GAYY contacted Calgary Terminal 36 miles south of Calgary reporting that he was level at 6,000 feet. The Calgary arrival controller acknowledged the transmission and provided GAYY with the appropriate altimeter setting. At about 1638, GAYY passed over the Calgary very high frequency omnidirectional range (VOR); the pilot did not provide a position report. Shortly after, the pilot saw a Boeing 767 high and descending at his three o'clock position at a range of four to five miles and on a near parallel course.

Air Canada Flight 121 (AC 121), a Boeing 767, was a scheduled flight from Toronto to Calgary. At 1637, AC 121 was descending through 12,500 feet and reported moderate turbulence. Calgary arrival cleared AC 121 to level off at 9,000 feet stating that overflying traffic was at 8,000 feet. The crew of AC 121 then requested vectors to provide separation with the reported traffic rather than remain in turbulence at 9,000 feet. Calgary arrival cleared AC 121 to an altitude of 6,500 feet on a heading of 290 degrees magnetic. At 1639:30, the crew of AC 121 reported level at 6,500 feet and was then cleared to maintain 6,000 feet and to turn left to a heading of 260 degrees.

The pilot of GAYY heard Calgary arrival give an Air Canada aircraft a vector and then saw the Boeing 767 turn left in his direction. The range at this time was about four miles, and the two aircraft were both at 6,000 feet. The pilot of GAYY turned right to ensure that he passed behind the Boeing 767 and began a climb to avoid any possible wake turbulence. He estimated that he passed about one-half mile behind the Boeing 767.

At 1641, the pilot of AC 121 reported passing traffic at his nine o'clock position as he saw GAYY turn behind him.

The controller took over the arrival position at 1615. At this time, AC 121 was 140 miles to the east, and GAYY was 90 miles south, both well outside the Calgary Terminal Control area. At 1627, the Lethbridge Sector controller of Edmonton Centre handed GAYY over to the Calgary arrival controller at a range of 38 miles; GAYY's altitude of 6,000 feet was indicated on the data strip. Less than one minute later, the pilot of GAYY called in at 6,000 feet.

It was only recently that the minimum northbound altitude had been lowered to 6,000 feet from 8,000 feet. The arrival controller had never had an aircraft pass through the zone at 6,000 feet.

In the 14 minutes prior to the incident, the controller was working eight aircraft, six of which were landing at Calgary. The ASR-5 radar used by Calgary Terminal control was installed in the mid 1960s. This radar does not provide such information as altitude, groundspeed, or aircraft identification.

Even though the data strip showed that GAYY was at 6,000 feet and the pilot reported that he was at 6,000 feet, the controller was conditioned to believe that the aircraft was at 8,000 feet, because this was, until recently, the minimum northbound altitude over Calgary. The pilot of GAYY omitted to provide a mandatory position report by the Calgary VOR. Had he done so, this may have alerted the controller to the actual altitude of GAYY.

Given the radar equipment available, the controller's workload was moderately heavy. More modern radar equipment would have displayed aircraft altitudes and likely would have alerted the controller to the potential risk of collision.

FINDINGS:

Cause Related:

1. The arrival controller cleared AC 121 to the same altitude and across the track of GAYY.
2. The controller was conditioned to believe GAYY was at 8,000 feet because this was, until recently, the minimum northbound altitude over Calgary.

Other:

1. The pilot of GAYY omitted a position report over the Calgary VOR.
2. The information provided to the controller on the ASR-5 radar display was limited.

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AIR CANADA
DOUGLAS DC-9 C-FTMM
MONCTON AIRPORT, NEW BRUNSWICK
15 MARCH 1985

REPORT NUMBER: 85-A54016 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0715 AST
OPERATION: Scheduled Domestic
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	14,890	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	6
PASSENGERS	-	-	94

SUMMARY REPORT:

A DC-9 aircraft was being prepared for a scheduled departure from Moncton, New Brunswick to Montreal, Quebec. The crew had completed the after-start checks, when several minor explosions were heard from behind the captain's seat. Flames and smoke were observed around the airstair handle, on the rear face of the wall behind the captain. The aircraft was immediately powered down, and the smoke and flames subsided. The passengers were deplaned in the normal manner via the airstair at the front entrance.

An access panel was removed from the wall behind the captain's seat, and it was determined that the AC electrical cross-tie relay and two current limiters attached to the relay were burnt out. The relay and limiters were removed and forwarded to the aircraft manufacturer for examination. The time since overhaul on the relay was 22,144 hours, and the manufacturer indicated that the failure was a direct result of excessive time in service for this component. Other operators overhaul similar relays at 7,000-to 10,000-hour periods. The relay manufacturer recommends overhaul at 7,000 hours for this particular relay.

FINDINGS:

Cause Related:

1. The alternating current electrical cross-tie relay and two attached current limiters burnt out, resulting in minor explosions, flames and smoke.
2. The time in service for the relay, since overhaul was excessive.

Aviation Occurrence Reports

Other:

-Nil-

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SKYLINK AIRLINES
PIPER PA-31-310 NAVAJO C-GJTE
VICTORIA AIRPORT, BRITISH COLUMBIA
19 MARCH 1985

REPORT NUMBER: 85-P50006 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1925 PST
OPERATION: Non-regular Specific Point
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,000	1,500
LAST 90 DAYS	70	70

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	5

SUMMARY REPORT:

After landing, as the pilot initiated a left turn off the runway, the gear warning horn began to sound, and the right gear collapsed. The aircraft skidded to a stop and came to rest on the right wing tip.

Inspection of the landing gear selector mechanism revealed that the anti-retraction solenoid pin was bent approximately one-eighth inch from the straight position. Ground testing revealed that, with the pin bent, the gear handle would occasionally remain unlocked when selected to the down position.

Further testing revealed that the spring within the gear handle selector sleeve was weak. When the gear handle was hydraulically returned to the neutral position, the weak spring was unable to reposition the gear handle consistently in the neutral detent. The gear handle could then be moved to the up position without first pulling the gear handle out.

The landing gear selector knob is located in the vicinity of the pilot's right knee. The pilot's right knee can accidentally contact the landing gear selector knob when left rudder is applied unless extra care is taken.

When the landing gear was lowered on final approach, the pilot confirmed that it was down and locked. When the landing gear handle was returned to the neutral down position, the weak spring in the handle allowed

the gear handle to go past the normal down position. The gear handle position, coupled with the bent solenoid pin, prevented the anti-retraction system from operating. As the pilot applied left rudder, his right knee could have brushed against the gear lever and raised it. Since the anti-retraction system was bypassed and the aircraft was in a left turn, centrifugal and frictional forces caused the right gear to fold.

FINDINGS:

Cause Related:

1. The anti-retraction solenoid pin was bent and prevented normal operation of the anti-retraction system.
2. The spring in the landing gear selector handle was weak and allowed the selector handle to be returned to an out-of-detent, normal down position.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

Transport Canada has issued a Service Difficulty Alert (SDA 85-02) on the Landing Gear Selector, Landing Gear Link Assembly - Piper PA-31 series aircraft. This SDA addresses the solenoid pin and retraction spring problems and notes that the material used in the solenoid plunger is relatively soft and easily deformed. Until this problem is rectified, the SDA states, "It is recommended that a visual inspection of the solenoid plunger and gear handle retraction spring be carried out as soon as possible to ensure their proper alignment and function."

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KENN BOREK AIR LIMITED
BEECHCRAFT C-90 KING AIR C-GKBB
INUUVIK AIRPORT, NORTHWEST TERRITORIES
04 APRIL 1985

REPORT NUMBER: 85-W54123 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1340 MST
OPERATION: Scheduled Domestic
DAMAGE: Minor
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,500	1,000
LAST 90 DAYS	80	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	7

SUMMARY REPORT:

Shortly after lift-off, and after the landing gear had been retracted, the pilot noticed that the top left engine cowl- ing was opening. He immediately reduced power to idle and landed wheels-up on the runway.

Following maintenance and a series of inspections, the top left engine cowl- ing was not properly secured prior to the flight. The engine cowlings had been removed the previous day for maintenance and had been reinstalled by the junior aircraft maintenance engineer (AME) who had worked on the aircraft. A senior AME inspected the work done, but he did not check that the cowlings were properly installed and fastened. Two of the four fast- eners that secure the top left engine cowl- ing had not been locked. Because of paint lines on the fastener and on the fuselage, it was obvious that one fastener was un- locked; it was not obvious that the second one was un- locked. Three people involved in this incident did not detect that the cowl- ing was not secure, the junior AME, the senior AME, and the pilot.

The pilot elected to land immediately, with the landing gear retracted, rather than fly a circuit with the cowl- ing loose. Aircraft control with the cowl- ing loose would have been unpredictable, and structural damage may have occurred if the cowl- ing had broken away in flight.

FINDINGS:

Cause Related:

1. The junior AME did not properly lock two of the four top left engine cowl- ing fasteners following installation of the cowl- ing.

2. The senior AME did not detect the unlocked fasteners when he inspected the work done by the junior AME.

3. The pilot did not detect the unlocked fasteners during his pre-flight inspection.

4. When the top left engine cowl- ing opened in flight, the pilot landed immediately with the landing gear retracted.

Other:

- Nil -

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NORTH CARIBOO FLYING SERVICE
PIPER PA-31 NAVAJO C-GPAC
PRINCE GEORGE, BRITISH COLUMBIA
08 APRIL 1985

REPORT NUMBER: 85-P54004 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1915 PST
OPERATION: Charter
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,700	1,000
LAST 90 DAYS	240	90

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

SUMMARY REPORT:

On take-off from Prince George, the aircraft collided with a duck. The bird broke the right front cockpit win- dow and entered the cockpit, narrowly missing the right front-seat occupant. The aircraft landed at Prince George without further incident.

Because of the low level of bird activity, a Notice to Air- men (NOTAM) concerning bird hazards and related precautions to scare away birds was not in effect at the time of the incident. The pilot was aware of the recog- nized bird avoidance procedures and did have his land- ing lights on.

FINDINGS:

Cause Related:

1. On take-off, the aircraft struck a bird damaging the right front cockpit window.

Aviation Occurrence Reports

Other:

- Nil -

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NORALTA FLIGHTS LTD.
CESSNA A185E C-FBYN
FORT CHIPEWYAN, ALBERTA 2 mi N
21 MAY 1985

REPORT NUMBER: 85-W50019 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 2023 MDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,900	803
LAST 90 DAYS	93	83

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The destination for the flight was a private airstrip two miles north of Fort Chipewyan. The pilot reported that there was a cross-wind from the right at 10 to 15 mph. The pilot stated that the landing was normal with the right wheel touching first. As the speed decreased and the tail came down, the aircraft began veering to the right. The left brake and rudder would not straighten the aircraft. As the aircraft was about to leave the runway, the pilot applied both brakes, and the aircraft ground looped to the right, and the left landing gear failed.

The Transport Canada Aeronautical Information Publication (AIP) Canada states that "aircraft of United States manufacture are designed to withstand ground looping tendencies on landing in 90-degree cross-winds up to a velocity equal to 20 per cent of this stalling speed." The Cessna Owner's Manual states that the full-flap, power-off stall speed of the aircraft is 59 mph. Therefore, the cross-wind limit for landing, from the above sources, is 11.8 mph.

The left landing gear had failed at the gear attachment nut which was found to have split lengthways. Wear on the gearbox indicated that the gear shims were loose. Examination of the nut confirmed the mode of failure to be ductile overload. No evidence of progressive failure or pre-cracking was found. Metallurgical analysis revealed a large number of manganese sulphide inclusions parallel to the longitudinal axis of the nut. The analysis indi-

cated the failure of the nut resulted from the abnormal loading during the ground loop. Contributing to the failure were the wear and looseness in the gear leg to gearbox attachment joint and the large number of manganese sulphide inclusions which reduced the ductility and tensile strength on the transverse axis of the nut.

The landing was attempted in wind conditions which approached the recommended cross-wind limits.

The following laboratory report was completed:
LP 140/85 - Landing Gear Failure.

FINDINGS:

Cause Related:

1. The pilot was not able to maintain directional control during the cross-wind landing, and the aircraft ground looped, causing the left landing gear to collapse.

Other:

1. There was evidence of wear and looseness in the gear leg to gearbox attachment joint.

2. The left landing gear attachment nut contained a large number of manganese sulphide inclusions reducing the ductility and tensile strength on the transverse axis of the nut.

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BUSH LAND AIRWAYS
CESSNA U206G C-GHSA
LAKE FROMENTEAU, QUÉBEC
29 MAY 1985

REPORT NUMBER: 85-Q50016 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0900 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,000	745
LAST 90 DAYS	132	132

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot was taking off in a northerly direction from a stretch of open water on a partially frozen lake. During

the take-off run, the left float dug into the water, and the aircraft veered to the left. The pilot regained directional control and continued the take-off. The right float struck a submerged rock, damaging the float. The pilot closed the throttle and beached the aircraft onto the shore.

The area of the lake used for the take-off provided approximately one mile of open water in a north-south direction. A tree-covered island lay parallel to and up-wind from the take-off area. There were several marked rocks within this stretch of water. The pilot estimated that the wind on take-off was from the west at approximately 25 mph. Environment Canada's analysis indicated that the wind was from the southwest at 10 to 15 knots.

For the majority of the take-off run, the aircraft was in the lee of the island and therefore sheltered from the effect of the cross-wind. Approaching lift-off, the aircraft passed the northern tip of the island and was exposed to the full cross-wind. The pilot had anticipated this and had applied left aileron so that the aircraft was left-wing-low as it cleared the island; however, the wind acting on the upper surface of the wing caused the left wing to lower to the point where the left float dug into the water. As the pilot had to re-establish directional control prior to lift-off, the take-off run was extended. During this extended portion of the run, the right float struck a submerged, unmarked rock.

FINDINGS:

Cause Related:

1. Because of the cross-wind, the pilot encountered directional control problems on take-off and, as a result, had to extend the take-off run.

2. During the extended portion of the take-off run, the right float struck a submerged, unmarked rock, damaging the float.

Other:

-Nil-

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KENN BOREK AIR LTD.

BEEHCRAFT B-99 AIRLINER C-GKBA
HOLMAN, NORTHWEST TERRITORIES
31 MAY 1985

REPORT NUMBER: 85-W54056 (Incident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1810 MDT

OPERATION: Regular Specific Point

DAMAGE: Minor

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,865	300
LAST 90 DAYS	200	200

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	7

HISTORY OF THE FLIGHT:

Shortly after take-off on a scheduled flight, an electrical burning odour was noticed. The burning odour subsided, and the flight continued. On arrival at destination, when the landing gear was selected down, it would not extend. The landing gear was recycled, without any success, and a manual landing gear extension was attempted, but the landing gear still would not extend. The pilot carried out an intentional wheels-up landing.

PERTINENT INFORMATION:

The electrical burning odour noticed after take-off was disregarded by the pilot, as it was believed to have been the result of selecting the cabin heat on.

The pilot elected to carry out a manual landing gear extension, when he had no indication that the gear was extending electrically. The D-ring was pulled to engage the emergency handle. When the handle was pulled up approximately 30 degrees, it seized and could not be moved. The pilot then pulled up the cabin floor to expose the landing gear motor. The electric motor was very hot, and there was a burning odour.

The pilot then gave his passengers an emergency briefing and carried out a wheels-up landing. The cargo pod on the bottom of the fuselage kept the aircraft high enough off the ground to prevent further damage to the fuselage, engines, and propellers.

Maintenance personnel disconnected and lowered the landing gear manually, and the aircraft was ferried to Inuvik, where further examination took place. The landing gear motor and activating gearbox were removed from

Aviation Occurrence Reports

the aircraft for technical examination. The landing gear motor was found to be burnt, while the activating gearbox, which had been seized, freed itself as it was being unbolted from the wing spar. The landing gear up-limit switches and up-stops indicated that the landing gear had been overretracted in the up-mode.

The landing gear motor was examined, and both up and down windings were burnt. It was determined that the motor burnt out while in the down selection. The clutch assembly in the activating gearbox showed signs of excessive heat, but it was determined to be capable of normal operation.

This particular motor had been installed in February 1981 to replace a motor that had been burnt out due to an intermittent microswitch. The Beech 99 overhaul manual states that these electric motors should be overhauled every 10,000 cycles, and the occurrence motor had accumulated only 4,775 cycles since overhaul. However, the extensive overheating damage sustained by the motor made it impossible to ascertain the condition of the motor prior to failure.

ANALYSIS:

Even though the landing gear had been overretracted, the up-limit switch did, in fact, make and remove electrical power from the landing gear motor. For the landing gear to be overretracted, the up-limit switch must be out of adjustment. Examination of the landing gear motor revealed that the burnt windings resulted from overheating over a period of time. However, the extensive overheating damage sustained by the motor made it impossible to ascertain the condition of the motor prior to its failure. The actuating gearbox seized when the landing gear was in the retracted position. The clutch in the actuating gearbox also showed signs of overheating, and this resulted in the clutch slipping. This could have been caused by the motor either trying to overretract the landing gear or trying to force the landing gear down, after the actuating gearbox had jammed. Since the gearbox freed itself, the cause of the seizure could not be conclusively determined. However, the teeth in the gear could have been temporarily jammed.

The seized actuating gearbox, combined with the burnt-out landing gear motor, prevented the pilot from extending the landing gear, either electrically or manually.

The following laboratory reports were completed: LP 175/85 - Landing Gearbox; and LP 176/85 - Landing Gear Motor.

FINDINGS:

Cause Related:

1. The burnt-out motor and seized gearbox prevented electrical or manual extension of the landing gear.

Other:

- Nil -

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RISK OF COLLISION BETWEEN: AMERICAN
AIRLINES FLIGHT 24 BOEING 727 and CESSNA
172 C-GBSL
TORONTO, ONTARIO 11 mi S
02 JUNE 1985
LOCAL TIME: 1755 EDT
INFORMATION SOURCE: Field Investigation

AMERICAN AIRLINES FLIGHT 24 BOEING 727

REPORT NUMBER: 85-O/54926 (Incident)
OPERATOR: American Airlines
OPERATION: Scheduled International
DAMAGE: None
PILOT LICENCE: Airline Transport

	PILOT-IN-COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	3	
PASSENGERS	-	-	N/A	

CESSNA 172 C-GBSL

REPORT NUMBER: 85-O/54926 (Incident)
OPERATION: Private Recreational
DAMAGE: None
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	200	200	
LAST 90 DAYS	5	5	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

HISTORY OF THE FLIGHT:

The Cessna 172 (C172) was on a visual flight rules (VFR) flight from London, Ontario to Oshawa, Ontario. Approximately 40 miles from Toronto, the pilot contacted Toronto Advisory and requested routing to Oshawa via the shoreline at 5,500 feet above sea level (asl). About 15 miles south of Toronto, Advisory requested that the pilot proceed further south of the shoreline to avoid conflict with arriving instrument flight rules (IFR) traffic involved in a runway change at Toronto. A Boeing 727 (B727), flying at 180 knots, was heading southeasterly at 6,000 feet on a converging flight path with the light aircraft. The B727 had established visual contact with the C172. The C172 pilot observed the B727 and realized that it would pass near her own aircraft. She waited for the VFR advisory controller to give her instructions for spacing. No instructions were provided, and she decided to initiate evasive action. She turned to the right through 360 degrees to avoid the B727 and its wake turbulence. Both aircraft arrived at their destinations without further incident.

PERTINENT INFORMATION:

At the time of the incident, the sky conditions were clear, and the flight visibility was greater than 10 miles.

The altitude readout of the B727 encoding altimeter shows that the aircraft descended to and maintained 6,000 feet asl until it was several miles south of the light aircraft's flight path. It was then cleared to 3,000 feet after the reported close encounter. When the pilot of the light aircraft saw the B727, she perceived it to be about 1,000 feet below her altitude and climbing. The Aeronautical Information Publication (AIP) Canada states, in paragraph RAC 4.1.1, that caution should be exercised whenever a flight is conducted behind and less than 1,000 feet below a large aircraft anywhere.

Although air traffic control does issue instructions to VFR flights and also issues traffic information to conflicting aircraft, the pilot-in-command of aircraft in VFR flight is responsible for avoiding other aircraft. The VFR advisory controller did not issue conflicting traffic information to the pilot of the light aircraft. The controller had numerous VFR aircraft flying through his area at the time of the incident, in conjunction with IFR traffic which was not under his jurisdiction.

ANALYSIS:

An arriving Boeing 727 flying at 180 knots in the terminal area would have a high nose-up attitude. Because of this attitude, the Cessna 172 pilot believed that the B727 was climbing and would be climbing through her

altitude. Her uncertainty about the altitude and the trajectory of the B727 was compounded by the lack of traffic advisory information provided by the busy controller. The standard 500 feet vertical spacing between IFR and VFR traffic was maintained, and the altitude readout confirmed that an evasive action to avoid a collision was not necessary. However, an evasive action to avoid wake turbulence from the larger aircraft was warranted in light of the caution given in the AIP. Because the advisory controller did not perceive any risk of collision, he did not issue specific instructions to the pilot of the C172.

FINDINGS:**Cause Related:**

1. The VFR advisory controller did not advise the C172 pilot of the direction and altitude of the B727.
2. The pilot of the light aircraft perceived the nose-high B727 as conflicting traffic and took evasive action.
3. Although a 500-foot minimum vertical spacing was constantly maintained between the two aircraft, a change of course by the light aircraft to avoid wake turbulence was warranted.

Other:

-Nil-

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Aviation Occurrence Reports

KEEWATIN AIR SERVICES
BEECH TC-45J C-GBLI
CORAL HARBOUR, NORTHWEST TERRITORIES
05 JUNE 1985

REPORT NUMBER: 85-C50033 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0954 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,200	1,500
LAST 90 DAYS	250	125

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	9

SUMMARY REPORT:

The aircraft was on a charter flight from Baker Lake, NWT to Coral Harbour. The captain, seated in the left seat, was at the controls. During the descent from Flight Level 90 (9,000 feet indicated altitude), ice began to accumulate on the airframe and windshield. The crew attempted to clear both, but the alcohol supply for the windshield de-ice system was depleted. A right-hand visual approach from the south to runway 15 was carried out, and the aircraft touched down on a flat stretch of esker, 221 feet left of the runway center line. The aircraft struck a snowbank, and the landing gear collapsed.

Coral Harbour has a single gravel strip; at the time of the accident, 95 per cent of the strip was covered with one-half to two inches of snow. The wind was from 110 degrees at 13 knots favoring runway 15, which was not an instrument runway, and the reported ceiling and visibility were below published circling minima. A snow fence was located to the left of that runway; the visual approach slope indicator system (VASIS) was located to the right, where there was less likelihood of it being drifted-in. Runway 15 did not have approach lights but did have strobe lights.

The crew reported seeing the ground when the aircraft was about 20 miles from the airport and decided to carry out a visual approach to runway 15. Both pilots stated that they saw the strobe lights and runway edge lights during the initial turn to final. On the roll-out, the aircraft was not lined up with the runway, and, in the manoeuvre to reposition for landing, each pilot momentarily lost sight of the lights. Once the aircraft was realigned, the co-pilot saw one set of runway lights to the right, and the captain saw a line of regularly spaced

objects to the left, which he believed were drifted-in runway edge lights. He also saw tracks in the snow which he believed were left by aircraft but were in fact made by construction vehicles driven parallel to the runway. Neither pilot could see through the ice that was covering the centre of the windshield; neither recalled seeing the VASIS at any time during the approach. The pilot-in-command knew that there was no alcohol in the windshield de-ice system prior to take-off. Light to moderate rime ice was forecast for the area. The co-pilot's press-to-talk switch had broken on departure from Baker Lake; so he was unable to communicate with the captain via the intercom system.

The lights that the co-pilot saw on final approach were the left-side runway lights, and the objects that the captain saw were stakes of the snow fence. Because of the low visibility, the drifted snow, the lack of approach lighting, and the ice on the windshield, the crew did not correctly acquire the landing environment, and they landed the aircraft to the left of the runway.

FINDINGS:

Cause Related:

1. The pilot-in-command initiated a flight into known icing conditions when the windshield de-ice system was empty, and, as a result, the crew was unable to clear the windshield of ice.
2. A visual approach was carried out in weather conditions reported to be below circling approach minima.
3. Because of a shortage of visual cues, the crew did not correctly acquire the landing environment and landed the aircraft left of the runway where it struck a snowbank and was substantially damaged.

Other:

1. The co-pilot was unable to communicate with the captain via the intercom system because the press-to-talk switch was broken.

SAFETY ACTION:

Action Taken:

The aircraft owner/operator has modified its Operations Manual to include a section that emphasizes crew responsibilities and procedures.

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MAULE 5-210-C C-GYOD
CRERAR LAKE, ONTARIO
05 JUNE 1985

REPORT NUMBER: 85-C50034 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1433 CDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,500	2,000
LAST 90 DAYS	40	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot of the float-equipped aircraft was landing into a very light wind. During the landing, the aircraft skipped on touchdown, and, as the aircraft slowed following the second touchdown, the wing tip dropped into the water. The aircraft then rotated left through about 120 degrees and rolled to an inverted position.

The left rear float strut had failed in overload at the junction of the float strut flange and the compression rubber mount. Laboratory analysis revealed that the failure was preceded by progressive pre-cracking adjacent to a poor quality weld. Following the second touchdown, the final overload separation of the component occurred, which then allowed the left wing to drop and contact the water.

The following laboratory report was completed: LP 282/85 - Float Strut Fracture.

FINDINGS:

Cause Related:

1. The left rear float strut failed in overload, causing the left wing to drop and contact the water.
2. The float strut failed adjacent to a poor quality weld.

Other:

-Nil-

→ → → → →

SAINT-LAURENT AVIATION
CESSNA U206E CGCGD
LAC SAUNIAI, QUEBEC
14 JUNE 1985

REPORT NUMBER: 85-Q50025 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1130 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	276	26
LAST 90 DAYS	26	26

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot was operating the float-equipped aircraft on a revenue flight from Lac Sauniat to Lac Paul Baie. Two clients were on board, one occupying the right front seat and the other sitting behind on the baggage, without a seat-belt. During the initial climb after take-off, at about 800 feet, the engine suddenly lost all power. After unsuccessfully attempting to restart the engine, the pilot made a 180-degree left turn in order to return and land on the lake. The aircraft could not reach the lake because it was too far away. After striking some trees, it crashed in a nose-down, left-bank attitude. On impact, the pilot was seriously injured when the rear passenger was thrown on top of him. The emergency locator transmitter was actuated, the signal was intercepted, and the occupants were rescued by a Canadian Forces helicopter.

There was no evidence of any pre-impact mechanical defects. The pilot had loaded the minimum quantity of fuel required to make the two-way flight between Lac Paul Baie, the location of the aircraft base, and Lac Sauniat. There was no 45-minute fuel reserve. The amount of fuel and oil carried on board any aircraft, other than a glider, a hang glider, a balloon, or an ultralight aircraft, at the commencement of any visual flight rules (VFR) flight must be sufficient, taking into account anticipated wind and other weather conditions, to fly to the place of intended landing and thereafter, in the case of an aircraft other than a helicopter, for 45 minutes at normal cruising speed. The purpose of loading a minimum quantity of fuel was to reduce the total take-off weight of the aircraft as much as possible. Before departing Lac Paul Baie, the pilot put five gallons of gas into the right tank. The outward flight was made on the left tank. Before taking off from Lac Sauniat, the pilot left the fuel selector lever on the left

Aviation Occurrence Reports

tank. Since the tanks were torn open by the impact, it was not possible to determine accurately what they contained before the accident. It was, however, established that the quantity of fuel in the left tank was insufficient for the two-way flight. When power was lost, the pilot switched on the electric pump but did not switch the fuel selector lever to the other tank.

The pilot and the passenger sitting in front were not wearing the shoulder harnesses of their seat-belts.

The engine failed as a result of fuel starvation during take-off because the fuel in the tank supplying it was exhausted. It was impossible to ditch the aircraft because of its low height and the distance from the lake. The pilot would have been less severely injured if he had been wearing the shoulder harness and if the passenger had not been thrown on top of him.

FINDINGS:

Cause Related:

1. The engine suddenly lost all power during the climb because the fuel selector lever was on an empty tank.
2. The pilot did not switch to the other tank after the power loss and was forced to attempt to land on the lake he had left.
3. The aircraft crashed in the forest because it was too low and too far from the lake to reach it.
4. The pilot would have been less seriously injured if the rear passenger, who was not secured by a seat-belt, had not been thrown on top of him and if the pilot had been wearing his shoulder harness.

Other:

1. The pilot was making a revenue flight, although he held only a private licence. The Air Navigation Order, Series IV, No 2 states that "A licensee who is the holder of other than a commercial, senior commercial or airline transport pilot licence shall not, except as provided in the Private Aircraft Exemption Order (Air Navigation Order, Series VII, No 1), accept remuneration for his services as a pilot or act as a pilot for the purposes of providing a commercial air service."
2. There was no 45-minute fuel reserve. Section 544 of the Air Regulations provides that "The amount of fuel and oil carried on board any aircraft, other than a glider, a hang glider, a balloon or an ultralight aeroplane, at the commencement of any VFR flight shall be sufficient, taking into account anticipated wind and other weather conditions, to fly to the place of intended landing and thereafter

(a) in the case of an aircraft other than a helicopter, for 45 minutes at normal cruising speed."

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KYRO'S AIRWAYS

DE HAVILLAND BEAVER DHC-II C-FOCZ

ROLLAND LAKE, ONTARIO

21 JUNE 1985

REPORT NUMBER: 85-O50046 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 1045 EDT

OPERATION: Charter

DAMAGE: Substantial

PILOT LICENCE: Senior Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,649	166
LAST 90 DAYS	166	166

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

SUMMARY REPORT:

The pilot of the float-equipped aircraft was on a charter flight to Rolland Lake with four passengers and luggage. During the approach to the lake, the aircraft's left wing dropped, and the left float struck the water, damaging the float aft bulkheads and the fuselage at the float strut attachment.

The pilot chose to land into a gusty 15-knot wind across the narrow lake rather than risk the cross-wind on the longer portion of the lake. The steep approach over the trees was carried out at a low airspeed. As the aircraft cleared the trees in a steep nose-down attitude, the pilot abruptly pulled the nose up to arrest the rapid descent. This sudden change of attitude at a slow airspeed may have caused the left wing to stall, thus resulting in the hard landing on the water.

FINDINGS:

Cause Related:

1. During a slow, steep, nose-down approach for landing on a narrow lake, the pilot pulled the aircraft nose up abruptly, which may have stalled the aircraft's left wing and resulted in a hard landing.

Other:

- Nil -

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RISK OF COLLISION BETWEEN: BOEING 737
C-GCPY and PIPER PA-31 NAVAJO
HALIFAX INTERNATIONAL AIRPORT, NOVA
SCOTIA
04 JULY 1985
LOCAL TIME: 0809 ADT
INFORMATION SOURCE: Field Investigation

BOEING 737 C-GCPY

REPORT NUMBER: 85-A54099 (Incident)
OPERATOR: Eastern Provincial Airways Ltd.
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	PILOT-IN COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	N/A	
PASSENGERS	-	-	N/A	

PIPER PA-31 NAVAJO

REPORT NUMBER: 85-A54099 (Incident)
OPERATOR: Eastern Flying Services
OPERATION: N/A
DAMAGE: None
PILOT LICENCE: N/A

PILOT HOURS:	ALL TYPES		ON TYPE	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	2	
PASSENGERS	-	-	-	

SUMMARY REPORT:

The airport visibility was restricted to less than one-half mile in fog. Category II instrument landing systems (ILS) approaches were being carried out on runway 24. The Eastern Flying Services Navajo was holding on the button of runway 15 waiting for the runway visual range (RVR) to increase to his take-off limit of 2,600 feet.

The Eastern Provincial Airways Boeing 737 taxied for departure on runway 24 and was cleared onto runway 15 to hold short of runway 24. As soon as the RVR reached 2,600 feet, the tower controller cleared the Navajo for take-off. The Boeing 737 crew advised the tower that they were still on runway 15. The Navajo was then instructed by the tower to reject the take-off. The aircraft was brought to a stop and returned to the button of runway 15.

Because of the low visibility, the tower controller could not see either aircraft on runway 15. Airport surface detection equipment is not available at Halifax Airport to aid the controllers during low visibility operations. It was determined that the controller had five departures - four for departure on runway 15 and one for departure on runway 24. The RVR was variable and was being monitored closely by the controller, so that the holding aircraft could be released as soon as possible. The controller was concentrating on the RVR readout in an effort to release the Navajo as soon as the RVR reached 2,600 feet. As a result, he became preoccupied with monitoring the RVR readout to the point that he forgot about the Boeing 737 sitting on runway 15 when he cleared the Navajo for take-off.

FINDINGS:

Cause Related:

1. An aircraft was cleared for take-off with another aircraft holding on the same runway.
2. The controller was preoccupied with monitoring the RVR readout, and, as a result, he forgot about the holding aircraft.
3. The active runway could not be seen from the tower because the visibility was restricted in fog.

Other:

1. Airport surface detection equipment is not installed at Halifax.

SAFETY ACTION:

Action Taken:

The Halifax air traffic control tower procedures have been amended to reflect that, during two runway operations in low visibility, "aircraft shall not be instructed to hold short on runways when they are not visible to the airport controller."

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Aviation Occurrence Reports

RISK OF COLLISION BETWEEN: BOEING 737
C-GCPN and BOEING 737 C-GFCP
VANCOUVER INTERNATIONAL AIRPORT
VANCOUVER, BRITISH COLUMBIA 25 mi E
17 JULY 1985
LOCAL TIME: 0755 PDT
INFORMATION SOURCE: Field Investigation

BOEING 737 C-GCPN

REPORT NUMBER: 85-P54045 (Incident)
OPERATOR: Canadian Pacific Airlines
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,200	2,500
LAST 90 DAYS	127	127

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	6
PASSENGERS	-	-	53

BOEING 737 C-GFCP

REPORT NUMBER: 85-P54045 (Incident)
OPERATOR: Canadian Pacific Airlines
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	9,210	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	6
PASSENGERS	-	-	107

HISTORY OF THE FLIGHT:

The two Boeing 737 aircraft, Empress 51 (E51) at flight level 310 and Empress 31 (E31) at flight level 350, were en route to Vancouver International Airport and were between Enderby and Vancouver. Shortly after E51 was cleared to 10,000 feet above sea level (asl), E31 which was following behind was also cleared to the same altitude. After both aircraft had reached the lower altitude, E31 overtook E51, and the pilot of the overtaking aircraft had to take evasive action.

PERTINENT INFORMATION:

From flight level 310, E51 was cleared to descend to 10,000 feet asl while following the Lanne standard instrument arrival procedure, and the pilot was asked to "give his best speed." While level at flight level 350, E31 was requested to reduce the speed "a tad." The pilot answered that he was "slowing up." Five minutes later, E31 was cleared to follow the same routing as E51 and was eventually cleared to descend to 10,000 feet asl. The radio terminology used to establish a speed differential between the two aircraft did not conform with the standards set out in the Air Traffic Control Manual of Operations which requires instructing the pilot to maintain a specific speed.

When E31 started its descent, about five miles horizontal separation and more than 5,000 feet vertical separation existed between aircraft, and this separation should have been increasing due to speed differentials. The pilot of E31 initially decreased speed and then increased it by 50 knots for about five minutes to intercept the altitude-to-distance ratio for his desired descent profile to the airport. During that period, the en route controller informed the arrival controller via the data controller of the speed differential between E31 and E51.

While both flights were descending to 10,000 feet asl, they changed to the arrival controller's radio frequency; however, the controller was busy handling low-level traffic following a runway change and did not notice that the separation between the flights was decreasing. E31 levelled off at 10,000 feet asl a short time after E51. When the arrival controller looked at the E31 and E51 targets on his radar scope, he noticed that they had merged, and he immediately instructed E31 to maintain 12,000 feet asl. Before the climb was initiated, the pilot of E31 caught sight of E51 and had to take evasive action. An additional controller was available, but the arrival controller felt he could handle the situation.

ANALYSIS:

The non-specific nature of the en route controller's request did not enable the crew of E31 to ascertain by how much the speed had to be reduced and for what period of time. The crew of E31 did not request any clarification and acknowledged the request.

The arrival controller was busy with other traffic, and he did not detect the progressive loss of the required separation between the two aircraft. He did not request assistance during a period of high workload.

FINDINGS:

Cause Related:

1. The clearance issued by the en route controller did not ensure separation between aircraft.
2. The radio terminology used to establish separation between the two aircraft did not contain specific instructions to the pilot.
3. The speed of E31 was increased after its crew had been requested by the en route controller to operate at a reduced speed.
4. The progressive loss of required separation was not detected by the arrival controller.
5. The arrival controller did not request assistance during a period of high workload.

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AIR NORTH CHARTER AND TRAINING LTD.
BRITTEN-NORMAN BN2A-G ISLANDER C-GKMJ
HAYES CREEK AIRSTRIP, YUKON TERRITORY
17 JULY 1985

REPORT NUMBER: 85-W50038 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 PDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Senior Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,176	300
LAST 90 DAYS	165	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

SUMMARY REPORT:

The aircraft became airborne but would not climb. It then flew through some small trees at the end of the strip, and, as it emerged, the pilot dived the aircraft into a valley to gain airspeed. As the speed increased, the pilot was able to gain altitude and fly the aircraft to Whitehorse, Yukon where an emergency landing was carried out.

The Hayes Creek Airstrip is located on top of a hill. It has one gravel runway oriented east/west. The first third of the runway slopes down to the west side of the hill and the remaining two-thirds slopes down to the east.

The strip is about 3,200 feet above sea level (asl), about 80 feet wide and about 1,500 feet long. Trees border the strip at both ends.

The pilot reported the wind as being a cross-wind from the left at 10 to 15 knots shifting to a possible quartering tail wind during the take-off. The temperature was about 15 degrees Celsius. The performance charts indicate that for the weight of the aircraft, a temperature of 15 degrees Celsius, and a pressure altitude of 3,200 feet asl, the aircraft will require about 1,500 feet to clear a 50-foot obstacle when taking off on a dry, level, paved runway in zero wind.

As the Hayes Creek Airstrip is situated on top of a hill and slopes mostly downhill toward the east, the pilot elected to take off in that direction. Given the wind and runway conditions, the strip was marginally suitable for the intended flight.

FINDINGS:

Cause Related:

1. The pilot elected to use an airstrip that was marginally suitable for the intended flight.
2. After becoming airborne, the pilot was unable to climb to avoid trees at the end of the strip.

Other:
-Nil-

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BISSETT AIR SERVICE LTD.
CESSNA 180 C-FUQD
RICE LAKE, MANITOBA
15 AUGUST 1985

REPORT NUMBER: 85-C50070 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1600 CDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,500	350
LAST 90 DAYS	200	200

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

Aviation Occurrence Reports

SUMMARY REPORT:

Moments after take-off from Rice Lake, at an altitude of about 200 feet, the aircraft's engine (Continental O-470-R13) lost power. In order to avoid landing on rough terrain, the pilot turned steeply back towards the lake. The aircraft descended in the turn, struck the water in a nose-down attitude, and overturned.

The weather is not considered a factor in this occurrence. The temperature was 14 degrees Celsius, and the winds were calm. Weight and centre of gravity were within the prescribed limits, and there were no pre-occurrence malfunctions reported.

The engine was capable of developing power and was running at impact. This was confirmed by power bends on both propeller blades and witness observations. The carburettor, although in poor condition, was functioning normally. The cause of the power loss was not determined.

The pilot stated that he discovered water and dirt in the felt chamois which was used to filter the fuel from a 45-gallon drum into the aircraft. There was no contamination found in the samples taken from the refuelling facilities at the company base following the accident. Water was discovered in the fuel system, following wreckage recovery from the lake, but it could not be determined if this contaminant was in the system prior to the accident.

Although the investigation did not discover any blockage in the fuel system, the pilot reported that several days later he found that the fuel line at the selector was plugged with foreign matter.

The aircraft stalled in the turn when the pilot attempted to return to the lake. There was insufficient height to recover from the stall, and no time available to attempt a restart.

FINDINGS:

Cause Related:

1. The engine lost power for undetermined reasons.
2. The aircraft stalled during a low-level turn, at an altitude from which recovery was not possible.

Other:

-Nil-

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RISK OF COLLISION BETWEEN: FALCON 50
N65HS and PIPER PA-31-325 C-GREQ
DORVAL AIRPORT, QUEBEC
22 AUGUST 1985
LOCAL TIME: 1151 EDT
INFORMATION SOURCE: Field Investigation

FALCON 50 N65HS

REPORT NUMBER: 85-Q54088 (Incident)
OPERATION: Private Company Business
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	5

PIPER PA-31-325 NAVAJO C-GREQ

REPORT NUMBER: 85-Q54088 (Incident)
OPERATOR: T.N. Air Inc.
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot of the PA-31-325, C-GREQ, was cleared to land on runway 24 left. Approximately one minute later, the Falcon 50, N65HS, was cleared to taxi on the same runway. The PA-31 landed short and came to rest 1,000 feet from the other aircraft.

At the time of the incident, visual meteorological conditions prevailed, and air traffic was light. There were two controllers on duty, and the supervisor was away from his station. Runway 24 left had been closed for maintenance during the morning. A few minutes before the PA-31 landed, the runway had been reopened, and the air controller had been so advised by the ground controller. The air controller, in turn, notified the arrival control-

ler that runway 24 left had reopened for the lunch hour. The latter then told the air controller that he was passing a PA-31 over to him, followed by two other aircraft for runway 24 left. The air controller, who had had initial contact with the PA-31, cleared him to land. He had previously verified that the runway was in fact clear. A few seconds later, the Falcon 50 asked the ground controller for clearance to taxi to runway 28. Believing that runway 24 left was not going to be used immediately, the ground controller cleared him to taxi to runway 28 via runway 24 left. He did not ask the air controller for clearance to use runway 24 left. While over the radio beacon during final approach, the PA-31 pilot saw the Falcon 50 taxiing on runway 24 left. He did not query the air controller because he thought the Falcon 50 was going to take off from runway 24 left.

When the ground controller cleared the Falcon 50 to taxi on runway 24 left, he assumed that there were no aircraft on final approach, and he did not check with the air controller. The PA-31 pilot did not mention anything to the air controller, and he assumed that the Falcon 50 was going to take off.

FINDINGS:

Cause Related:

1. The ground controller cleared the Falcon 50 to taxi on the active runway without requesting clearance from the air controller.
2. The pilot of the PA-31 landed without querying the air controller about the Falcon 50 on the runway.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

In its report on a special investigation into the Risk of Collisions Involving Aircraft On or Near the Ground (August 1987), the Canadian Aviation Safety Board addressed intra-tower coordination as a critical phase in the safe control of aircraft in the vicinity of aerodromes. It was noted that failure to coordinate effectively between the ground and airport controllers has been causal in several occurrences and that breakdowns in tower coordination may be attributable to inadequate procedures or the use of non-verbal communications in the coordination process, thereby leading to erroneous assumptions. In view of these findings, the CASB recommended that:

The Department of Transport review the adequacy of current procedures for effecting intra-tower coordination between the ground and airport controllers.

CASB 87-23

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LES POURVOIRIES FORTIER INC
BEECH D18S C-FCWM
SCHEFFERVILLE, QUÉBEC
30 SEPTEMBER 1985

REPORT NUMBER 85-H50005

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4	437 280
LAST 90 DAYS	310	209

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	7	-	-

SYNOPSIS:

The Beech D18S was transporting caribou hunters and their equipment between the company's Wedge Hills hunting lodge and the Schefferville Airport. The accident flight was uneventful until the pilot began his visual approach to runway 36 at Schefferville. Visibility at the airport was reduced in a snow shower, and the pilot missed his approach to the runway. While manoeuvring at low altitude for a second approach, the aircraft was seen to enter a dive and crash in a wooded area 1.6 nautical miles east of the airport. All eight occupants received fatal injuries, and the aircraft was destroyed by impact and fire.

A lethal level of hydrogen cyanide was found in blood samples of the pilot and some of the passengers. These findings are consistent with the pilot's becoming incapacitated and losing control of the aircraft prior to impact. The source of hydrogen cyanide could not be established, but it is usually associated with either pyrolysis or combustion of certain synthetic and natural materials.

FINDINGS

Cause-Related Findings

1. The pilot became incapacitated and lost control of the aircraft, which then stalled and crashed.
2. The pilot inhaled toxic levels of hydrogen cyanide from an undetermined source prior to impact.

Aviation Occurrence Reports

Other Findings

1. The pilot continued flight into an avoidable snow shower.
2. The actual weather conditions were below the conditions forecast by Environment Canada.
3. The pilot was suffering from chronic asthma for which he was self-medicating.
4. The pilot had not declared his asthmatic condition to any aviation medical examiner as required by regulation.
5. After a previous accident on 12 March 1985, there was inadequate Transport Canada follow-up assessment of the pilot's competence and medical fitness to hold a licence.
6. The pilot was certified and qualified for the flight in accordance with existing regulations.
7. The company held a valid CTC licence for commercial operations; however, its operating certificate had been suspended by Transport Canada prior to the accident.
8. Both engines were found with cracks in their exhaust collector rings.
9. The aircraft's right engine had been operated beyond its approved time between overhaul.
10. The company did not adhere to DOT approved maintenance practices.
11. It was estimated that, at the time of the accident, the aircraft was slightly above its maximum permissible weight; the centre of gravity was within allowable limits.
12. There were no facilities for weighing cargo at Wedge Hills.
13. Weight and balance reports were not being completed before each flight.
14. Special surveillance at Schefferville by the regulatory agencies did not prevent what Transport Canada believed were illegal commercial operations by the company during two hunting seasons.
15. Breaches of Air Regulations and Air Navigation Orders were not consistently reported by the FSS at Schefferville.
16. The Schefferville VOR/DME position and elevation were published incorrectly in the Canada Flight Supplement.

17. The ELT did not operate because it had been selected to the OFF position.

SAFETY ACTION

Action Taken

1. Aircraft Operating Beyond Weight and Balance Limitations

The Department of Transport (DOT) conducted a national safety campaign in 1986 which publicized the dangers of operating aircraft beyond weight and balance limitations. Additionally, a review of accident data was conducted by DOT to identify those types of operations in which weight-and-balance-related accidents prevailed; consequently, DOT enforcement activity was directed at these types of operations. The Board believes that the publication of the hazards associated with overweight operations and the deterrent value which results from the judicious enforcement of regulations will assist in the prevention of this hazardous operating practice.

2. Department of Transport Surveillance

As a consequence of a previous accident (refer to Report Number 84-H40006), the CASB issued Recommendation CASB-86-18 to the Minister of Transport which addressed inadequacies in the conduct of surveillance by officials of DOT.

The CASB recommended that:

The Department of Transport ensure that while implementing current administrative changes (i.e., within the department):

- a. there are adequate internal directives to fulfill the objectives of Regional Master Surveillance Plans; and that
- b. there is adequate coordination between the Air Navigation and Aviation Regulation directorates to provide effective surveillance.

(CASB-86-18)

Subsequently, DOT completed a study of the effectiveness of surveillance activities in 1986, and amendments to departmental procedures have been proposed. The circumstances of the accident at Schefferville, which occurred prior to the DOT study of its surveillance methods, underline the need for procedural revisions to be implemented as soon as practicable.

3. Inaccuracies in the Canada Flight Supplement

Corrective measures by DOT were taken immediately after the accident to inform the aviation community of errors in the Schefferville listing of the Canada Flight Supplement Class 1 NOTAM was issued with corrected

altitude and bearing information pertaining to the location of the VOR, and the CFS was subsequently amended.

Action Required

1. The Inappropriate Use of Medications by Flight Crews

The use of over-the-counter (OTC) medications or the inappropriate use of prescribed medications by flight crews is a potentially hazardous practice. The treatment of an illness with medications by a pilot who continues to perform flight duties can be unsafe for a number of reasons: the illness may be more serious than the pilot has diagnosed; the medication may result in pilot performance degradation at altitude, with effects such as drowsiness, tenseness, dehydration, and fatigue; and unpredictable side-effects may result from the use of more than one medication.

It is noteworthy that most of the approximately 500 OTC medications available today are composed wholly or in part from seven drugs or chemicals, five of which have significant side-effects to the pilot. The inappropriate use of prescribed medication while flying can have similar hazardous results. Some medications have been approved for use while flying after they have been thoroughly evaluated and once there is certainty that the medication has no side-effects which degrade a pilot's performance in flight. To ensure that flight duties can be conducted safely, the pilot must inform his physician (preferably an aeromedical physician) prior to being treated that he is a pilot, and the pilot must adhere to the restrictions of any medication which has been prescribed.

In large flying organizations such as the military or major air carriers, the hazards of using OTC medication or inappropriately using prescribed medication while performing flight duties are regularly reinforced. However, there is little such exposure for employees of small commercial operators or to members of the general aviation public.

The Aeronautical Information Publication (AIP) published by Transport Canada contains several paragraphs on the hazards of flying while taking medication. Nonetheless the Board believes that additional avenues should be explored to reinforce the safety implications of this hazardous practice. By additional use of safety promotional media and in the conduct of Regional Aviation Safety Officer (RASO) and Company Safety Officer Programs, the important aspects of the effects of medication could be highlighted to operators of small air carriers and members of the general aviation public. Accordingly, to assist in the prevention of the inappropriate use of medication while flying, the CASB recommends that:

The Department of Transport expand its program of information dissemination pertaining to the hazards of inappropriate use of medication while flying.

(CASB-87-12)

2. Inadequacy of DOT Surveillance

While the CASB recognizes that DOT has placed a high priority on improving the conduct of surveillance since this accident occurred, the Board believes that the investigation reveals weaknesses in procedures and planning which warrant further remedial action. Deficiencies have been identified in the DOT procedures for suspending an operating certificate and for training flight service station (FSS) specialists in detecting infractions of the regulations.

a) Procedures for Suspending Operating Certificates

An operating certificate is issued by DOT only to ensure that a company is suitably equipped and able to conduct a safe commercial operation. Suspension or cancellation of an operating certificate is the indication that DOT specifications for the safe operation of a company have not been met. Upon cancellation or suspension of an operating certificate, DOT Air Carrier Inspectors cease to be responsible for monitoring or auditing the operation of the decertified carrier, as commercial operations are no longer authorized. However, there is no procedure within DOT which ensures that the information relating to any such operating certificate action is consistently relayed either to Enforcement officials, or to FSS officials who are often best located for the detection of any unapproved operations. There are procedures contained within the DOT published Certification Manual (TP 4711E) which provide for the discretionary decision to inform the Enforcement Branch of the cancellation or suspension of an operating certificate; however, this practice is usually employed only when the revoking of the operating certificate has been directly related to violations of the Air Regulations. Consequently, the timely communication of information necessary for the Enforcement Branch to detect ongoing illegal commercial operations by effective surveillance planning is degraded. The inability of DOT to detect the continuation of commercial flights despite the failure of the company to meet the criteria for a safe operation constitutes a safety deficiency. Accordingly the CASB recommends that:

The Department of Transport amend their procedures to ensure that in every case in which an air carrier's operating certificate is cancelled or suspended by Transport Canada, the officials within the department most capable of detecting a continuation of commercial operations be notified in a timely manner.

(CASB-87-13)

b) Flight Service Station Specialist Training

The investigation of this accident revealed that, despite national and regional guidelines contained in manual of operations (MANOPS) and Master Surveillance Plans, FSS specialists did not detect and consistently report instances in which safety appeared to have been compromised. Furthermore, this deficiency appears to be national in scope; statistics compiled by the Enforcement and Legislation Branch of DOT for 1985 revealed that FSS specialists throughout Canada reported only 10 per cent of the detected violations of regulations. In comparison, it should be noted that the general public reported 13 per cent, and DOT inspectors, who generally detect violations only while conducting audit or surveillance trips in the field of operations, reported 24 per cent of the total.

The Board believes that since FSS Specialists are expected to detect and report suspected regulatory infractions, they must be adequately trained. Yet these DOT employees, who by virtue of their location at airports throughout the country are ideally situated to detect unsafe operating practices, receive less than two hours training on the Aeronautics Act in their initial 30-week training course. Furthermore, there is no training to qualify them to detect the contravention of safe operating practices. Initial and recurrent training is mandatory for DOT inspectors, and the Board believes that a similar program designed for FSS specialists would enhance the ability of the DOT in the detection of unsafe operating practices. The Board recognizes that FSS specialists have been assigned a number of additional responsibilities in the last several years and that the resource implications, including training for such added duties, must be rationalized. Nevertheless, the CASB recommends that:

The Department of Transport develop and implement training program designed to enhance the capability of flight services station specialists to detect violations of the Air Regulations and Air Navigation Orders.

(CASB-87-14)

3. Other Safety Concerns

a) Interdepartmental Coordination: CTC and DOT

A lack of coordination between the Canadian Transport Commission (CTC) and DOT contributed to the undetected continuation of passenger-carrying operations while the company's operating certificate was suspended. As the conditions of an operating certificate are stipulated by DOT to ensure safety in a commercial operation, the Board believes that interdepartmental coordination of information relating to inadequacies in the safe operation of an air carrier is essential.

The investigation of this accident revealed that, while procedures exist within the CTC and DOT to coordinate the issue of, or the revision to a licence and an operating certificate, the procedures are inadequate in instances where a delay is incurred in the licensing action. Nonetheless, with the impending passage of Bill C-18, entitled the National Transportation Act, a significant change of procedures in both agencies will be forthcoming. Discussions with officials of CTC and DOT indicate that the deficiency will no longer exist after the passage of the Bill. The CASB will review the revised procedures as they pertain to this deficiency when they have been implemented.

b) Inadequate Post-accident Follow-up of Pilot Competence and Medical Fitness

The Board is concerned that there was inadequate assessment of the pilot's competence and medical fitness for continued commercial flying duties after the accident on 12 March 1985. Consequently, a review of CASB accident data and the procedures of DOT and Health and Welfare Canada was made. While there have been instances of repeat accidents involving particular pilots, no fundamental safety deficiency in current procedures subsequent to an accident has yet been identified. However, comprehension of the psychological factors which may be causal to repeat accidents involving certain pilots is incomplete; to improve its understanding of the phenomenon of repeat accidents the Board will continue to monitor ongoing studies pertaining to "accident proneness."

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ALERT AIRWAYS GROUP

CESSNA U206G C-GIWL

FORT MCMURRAY, ALBERTA 18 mi SW

14 OCTOBER 1985

REPORT NUMBER 85-W50056

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5	000 N/A
LAST 90 DAYS	235	155

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	2	-	-

HISTORY OF THE FLIGHT

The Alert Airways Group, float-equipped Cessna U206G, C-GIWL, departed Fort McMurray at 1145 MDT, 14 October 1985 to pick up two moose hunters at

Little Buffalo Lake, approximately 70 miles to the west, and return them to Fort McMurray.

At 1338 MDT, the aircraft was observed flying at an altitude of approximately 50 feet above the water in an easterly direction over the Athabasca River, in the direction of Fort McMurray. This sighting was near Brule Rapids, about 30 miles southwest of Fort McMurray. Five to 10 minutes later, the aircraft was again sighted, this time by a party of four moose hunters, about 18 miles southwest of Fort McMurray. The aircraft was flying in an easterly direction very close to the water.

The Cessna was next sighted at 1500 MDT, taxiing on the river near Moose Island, by the pilot of a Beaver flying west from Fort McMurray along the Athabasca River to pick up the four moose hunters mentioned above. Moose Island is about one mile downstream from where the four moose hunters were waiting for the Beaver.

At 1600 MDT, the Beaver took off with the four passengers on board for the return flight to Fort McMurray. As they flew by Moose Island, they saw the Cessna 206 on Moose Island, where it had crashed.

The accident occurred at lat 5635'N, long 11148'W at approximately 1500 MDT during the hours of daylight.

ANALYSIS

The pilot lost control of the aircraft shortly before the accident. As the weather was suitable for visual flight and as the medical information revealed that the pilot's performance was not affected by incapacitation, the investigation considered other areas to determine the circumstances leading to the accident.

FINDINGS

Cause-Related

1. Fuel starvation prevented the engine from developing power.
2. The aircraft stalled, rolled to an inverted position, and nosed down into the ground.

Other

1. For undetermined reason, the ELT was not functioning at the time the aircraft was discovered.

SAFETY ACTION

The Board has no aviation safety recommendations to issue at this time.

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PEACE AIR LTD.
CESSNA A185F C-GAYZ
SLAVE LAKE AIRPORT, ALBERTA
18 OCTOBER 1985

REPORT NUMBER: 85-W50058 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1235 MDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,000	30
LAST 90 DAYS	200	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot had completed the last leg of a charter flight from Chipewyan Lake to Slave Lake Airport where he landed on runway 27 in a light tail wind. During the landing roll, the pilot heard a thumping noise and felt a vibration coming from the tail of the aircraft. He reduced the back pressure on the elevator control, and the intensity of the noise and vibration decreased; however, the aircraft began to swing to the left. The pilot was unable to regain control, and the left wing struck the ground, causing substantial damage to its tip. The aircraft came to rest in an upright position on the runway.

The reported surface wind at the time of the accident was 080 degrees magnetic at three knots. The pilot stated that, based on smoke from a nearby manufacturing plant, he thought there was a strong wind from the west at 100 to 200 feet above ground level, and he decided to accept the light tail wind on landing.

The tail wheel locking mechanism was examined and found to be worn. When the tail wheel was under load, the tail wheel locking spring snapped out of its recess in the tail wheel steering arm because the recess was excessively worn. The lack of restraint on the tail wheel caused it to shimmy during the landing roll. The cause of the excessive wear was not determined.

The pilot was able to reduce the tail wheel shimmy by decreasing the back pressure on the elevator control; however, this action allowed the aircraft to ground loop.

FINDINGS:

Cause Related:

1. The tail wheel locking mechanism was worn for undetermined reasons.
2. When the tail wheel began to shimmy during the landing roll, the pilot decreased the back pressure on the elevator control, and the aircraft ground looped.

Other:

-Nil-

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ILFORD RIVERTON AIRWAYS

CESSNA 402B C-GGKF

JENPEG, MANITOBA

05 NOVEMBER 1985

REPORT NUMBER: 85-C50090 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1300 CST

OPERATION: Charter

DAMAGE: Substantial

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,500	100
LAST 90 DAYS	270	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	6

SUMMARY REPORT:

Flight 202 departed Jenpeg at 1300 central standard time for a flight to Winnipeg. Initially, the aircraft accelerated normally as power was applied and the speed increased to 85 knots. The take-off run was continued although the aircraft speed did not get above 85 knots. At the end of the runway, the pilot forced the aircraft into the air. The aircraft momentarily stayed airborne in ground effect and then began to sink. Power was reduced, and the aircraft came to rest on the runway clearway 1,000 feet past the end of the runway.

Although snow removal equipment had been working to remove snow from the runway prior to the aircraft's departure, snow continued to fall, and there were two inches of snow covering the loosely gravelled runway when the take-off commenced. The pilot became aware of the effect of the snow on aircraft performance when the speed did not increase above 85 knots. However, the take-off was continued, and the aircraft, although below

flying speed, was forced into the air. The aircraft was at its maximum take-off weight of 6,300 pounds, and the take-off speed should have been 91 knots. There were no pre-accident aircraft failures or malfunctions that contributed to the accident.

The aircraft could not fly out of ground effect at the lift-off airspeed. When the aircraft began to sink, the pilot elected to land rather than continue toward high trees at the end of the clearway.

FINDINGS:

Cause Related:

1. The two inches of snow covering the runway affected the aircraft performance, and the aircraft was forced into the air at below a safe flying speed.
2. The pilot did not reject the take-off in sufficient time to make a safe stop on the runway.

Other:

-Nil-

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CESSNA 172P C-GTDK

FAIRVIEW AIRPORT, ALBERTA

14 JANUARY 1984

REPORT NUMBER: 84-W40003

INFORMATION SOURCE: Field Investigation

OPERATION: Specialty training

PILOT LICENCE: Private

DAMAGE: Substantial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	88	88
LAST 90 DAYS	11	11

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT

The pilot was conducting night visual circuits. She reported the wind as 90 degrees to the runway at about 20 kt while another pilot estimated it as 5 kt. On the second circuit, as power was applied for take-off, directional control was lost. The aircraft swerved left, departed the runway, struck a snowbank then travelled about 150 ft and nosed over.

The pilot was inexperienced on type; this particular Cessna 172 model had a more powerful engine than she was used to. In addition, the pilot did not recognize the beginning of a directional swing and rudder and brake inputs were insufficient to prevent the aircraft from leaving the runway. Her attempts at regaining directional control may have been hampered by the snow covering the runway.

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COLLISION BETWEEN: PIPER PA-28-140
CHEROKEE C-FGCS and CESSNA 172G C-FSSI
ROBERVAL AIRPORT, QUEBEC 34 mi SSW
29 JUNE 1984
LOCAL TIME: 1818 EDT
INFORMATION SOURCE: Field Investigation

CESSNA 172G C-FSSI

REPORT NUMBER: 84-Q40803 (Accident)
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,000	1,500
LAST 90 DAYS	100	75

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

PIPER PA-28-140 CHEROKEE C-FGCS

REPORT NUMBER: 84-Q40804 (Accident)
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	126	38	163	60
LAST 90 DAYS	16	16	26	26

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	2	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

Four airplanes took off from Mascouche, Quebec, on a visual flight rules (VFR) pleasure flight to Roberval, Quebec. There were three Cessna 172 aircraft and one Piper PA-28 aircraft. The pilots had planned to fly in formation during the trip.

En route, the Cessna 172, C-FSSI, was maintaining a loose formation on the right of the lead aircraft, and the Piper PA-28, C-FGCS, was on the extreme right of the formation. While cruising at 5,000 feet above sea level (asl), the Piper was observed to close in on the Cessna. The pilot-in-command of the Piper was heard to comment "you are too close". The Piper then nosed down and descended while continuing to close in and go below the Cessna. The pilot of the Cessna lost sight of the Piper and initiated a shallow climb. Moments later, both aircraft collided. The collision left both aircraft entangled momentarily, until the pilot of the Cessna was able, by abrupt flight control inputs, to free his aircraft. The engine of the Cessna lost complete power but was later restarted, and the aircraft landed at destination. The Piper aircraft was observed to tumble uncontrollably until ground impact, which destroyed the aircraft and killed both occupants.

None of the aircrew involved had received any formal formation flying training, nor was a thorough pre-flight briefing held. The pilots were listening on the same radio frequency, and there was no indication of any pre-collision unserviceabilities. Weather at the time of the collision was not a factor.

Formation flying is an exacting task. Substantial training is required in engine power management, position keeping, and relative manoeuvring. None of the aircrew involved had received any such training.

It is likely that, while attempting to control his lateral separation, the pilot of the Piper lost visual contact with the Cessna and did not take positive action to avoid a collision. The damage sustained by the Piper aircraft during the collision rendered control of the aircraft impossible and the crash inevitable.

FINDINGS:

Cause Related:

1. The pilots involved had not received any formal preparation for formation flying.
2. The Piper PA-28 collided with the Cessna and suffered damage which resulted in the loss of aircraft control.

Aviation Occurrence Reports

Other:
-Nil-

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CHILLIWACK FLYING CLUB
CESSNA 172N C-GZBG
ALLISON PASS, BRITISH COLUMBIA 4 mi W
03 AUGUST 1984

REPORT NUMBER: 84-P40041 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0830 PDT
OPERATION: Flying Club Recreational
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	627.0	30.0
LAST 90 DAYS	0.5	0.5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	2	-	-

HISTORY OF THE FLIGHT:

The aircraft departed Chilliwack, British Columbia, at 0738 PDT on a direct visual flight rules (VFR) flight to Penticton, filed at 8,000 feet above sea level (asl). The aircraft was found later the same day; it had struck a mountain slope at about the 6,000-foot level and burned. The three occupants died in the crash.

PERTINENT INFORMATION:

At impact, the aircraft was in level flight, the flaps were fully extended, and the engine was at high power. There were no reported pre-crash aircraft unserviceabilities, and none were discovered during the investigation. The emergency locator transmitter (ELT) did not activate; it was presumed destroyed by fire. The aircraft weight and centre of gravity were probably within limits. The pilot was not instrument rated.

The pilot checked the destination and en route weather forecasts and actuals prior to departure from Chilliwack. The forecasts indicated that there would be scattered cloud based at (all heights asl) 5,000 to 6,000 feet, scattered cloud based at 10,000 to 12,000 feet, with occasional broken layers at 5,000 and 10,000 feet in the Chilliwack area. There were a few thunderstorms forecast in the Penticton area. Because the region is mountainous with peaks to over 8,000 feet and many peaks over 6,000 feet, cloud would occasionally be at

ground level. The actual conditions reported at 0700 PDT for points along the route indicated that the weather was basically as forecast. Based on the weather information received, the pilot concluded that the weather was suitable for VFR flight and that he would occasionally have to circumnavigate local cloud.

A pilot, who took off from Chilliwack at 0730 PDT and flew by Hope and north to Kamloops, reported that the weather was worse than forecast with overcast ceilings at 3,900 to 4,500 feet in the Chilliwack/Hope area and light rain at Hope. The area to the east of Hope looked darker with visible rain and cloud down to ground level in places.

During the investigation, a similarly loaded Cessna 172N was flown to determine the flying characteristics with the flaps extended, with the trim set as on the accident aircraft, and with the engine at full power. The aircraft flew in level flight at 65 knots indicated air speed (KIAS). It was reported that the accident pilot had previously flown in this configuration when he had encountered unfavourable visual conditions.

An examination of the surface (skin) of the crashed aircraft revealed streaks of dust. The aircraft had been flying through moisture (rain, mist) which caused lines of water to follow the airflow. Dust and dirt thrown up during the impact adhered to the water which subsequently dried; the lines of dust remained.

ANALYSIS:

The aircraft struck the mountain while in level flight, indicating that the aircraft was not out of control and that the pilot was not incapacitated. As well, there was no indication of any pre-crash malfunction that could have contributed to the accident.

There were clouds in the area that, at times, would have been at ground level; the aircraft exhibited evidence that it was flown through precipitation or moisture immediately prior to the accident; the flight test and witness testimony show that the aircraft was purposely being flown slowly (so that the pilot could see possible obstructions); and the aircraft struck the mountain while in level flight. All of the preceding factors indicate that the aircraft and the mountain were in cloud and that either the pilot did not see the mountain or he did not see it in time to take evasive action. It is not known why the pilot continued flight into deteriorating weather.

FINDINGS:

Cause Related:

1. The pilot flew into an area of reduced visibility in cloud, in mountainous terrain.

Other:

-Nil-

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PERIMETER AVIATION LTD.
BEECH E95 C-FKMZ
WINNIPEG INTERNATIONAL AIRPORT,
MANITOBA
19 DECEMBER 1984

REPORT NUMBER: 84-C40096 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1120 CST
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	PILOT-IN-COMMAND		PILOT-EXAMINER	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	6,100	25	9,015	200
LAST 90 DAYS	4	4	25	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was landing the aircraft following an instrument flight test with a flight examiner. On touchdown, the landing gear was partially extended and collapsed; the aircraft slid along the runway for 500 feet, before coming to rest in an upright position. The landing gear, the fuselage, the propellers and the engines were substantially damaged.

A review of the aircraft documentation indicated that the total airframe time was 16,902 hours and that the aircraft had been maintained in accordance with applicable directives.

The investigation revealed that, after touchdown, the landing gear doors were partially open as the aircraft slid along the runway. Cradled inside and against the doors, the stationary main wheel tires suffered wear and melt damage due to friction heat. The wear pattern on

the tires indicated that the landing gear was only partially extended when the aircraft touched down.

Examination of the landing gear found that the threaded end of the right main landing gear door linkage had failed because of fatigue and had separated. The failure allowed the threaded end of the linkage to drop into the primary structure of the fuselage. Compression marks on the end of the linkage and a bulkhead indicated that the rod jammed against the bulkhead after only a short movement when the landing gear was selected down. Because of this failure, the landing gear could not have been extended fully by either the normal or emergency method.

The landing gear position lights and unsafe condition aural horn were found to be operating normally and were reported to have operated normally throughout the flight. The throttles were not retarded sufficiently during the landing to initiate the aural unsafe warning tone.

FINDINGS:

Cause Related:

1. The aircraft was landed with its landing gear partially extended.

2. The right main landing gear door linkage failed due to fatigue.

Other:

-Nil-

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Aviation Occurrence Reports

AVIATION QUEBEC LABRADOR
BEECH 18H C-FFTB
SEPT-ÎLES AIRPORT, QUÉBEC
09 JANUARY 1985

REPORT NUMBER: 85-Q50002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1056 EST
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	PILOT-IN COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	5,000	900	3,300	0
LAST 90 DAYS	150	81	50	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft captain, who was also a company training pilot, was giving the co-pilot his first formal Beech 18 training flight. The co-pilot was to fly the take-off from the right seat, and the captain had briefed him to expect a simulated engine failure during the take-off run. The co-pilot commenced the take-off, and, at an airspeed of approximately 40 mph as the tail wheel lifted off the runway, the captain simulated a failure of the right engine by retarding the right throttle. The aircraft began to veer to the right, and the co-pilot retarded the left engine throttle. The aircraft continued to veer to the right and, simultaneously, the captain applied left rudder and the co-pilot right aileron. The aircraft then veered sharply to the left. The captain attempted to correct by applying left engine power and right brake but was unsuccessful. The aircraft left the runway; the main wheels dug into a snowbank 50 feet from the side of the runway, and the aircraft pitched forward onto its nose.

Although the co-pilot had not logged any time on the Beech 18, he had flown approximately ten hours of familiarization in the aircraft and had carried out four or five take-offs from the right seat.

In the Beech 18, the point in the take-off run at which the tail wheel is lifted off the runway is critical because the rudder is only marginally effective. An asymmetric power condition at this point requires immediate and precise control inputs in order to maintain directional control.

Although the co-pilot was an experienced and current pilot, the familiarization flying that he had received on the Beech 18 would not have prepared him to handle the simulated take-off emergency. Such an emergency procedure would normally be introduced later in a pilot's training, after he had demonstrated proficiency in handling less demanding exercises. The co-pilot did not apply left rudder to correct the initial veer to the right. At 40 mph, his right aileron input would have had little effect on the aircraft and perhaps illustrates his unfamiliarity with this aircraft type. When the captain did apply left rudder, he overcorrected and was subsequently unable to prevent the aircraft from leaving the left side of the runway.

FINDINGS:

Cause Related:

1. The captain induced a simulated engine failure at a critical point during the take-off run.
2. When the aircraft veered to the right during the simulated engine failure, the captain overcorrected, and, as a result, the aircraft went off the side of the runway.
3. The co-pilot did not have sufficient training on type to enable him to cope with a simulated emergency of this nature.

Other:

-Nil-

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MELFORT AIRWAYS
CESSNA 152 C-GUSO
MELFORT, SASKATCHEWAN
01 MARCH 1985

REPORT NUMBER: 85-C50012 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1100 CST
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	16	9
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

Following a dual check-out, the student pilot was authorized to practise solo circuits. The first touchdown was slightly short of the intended landing area. The nose gear struck a snow ridge left by a grader and collapsed.

The pilot intended to land on the taxiway in lieu of the runway in order to avoid a cross-wind condition. He landed heading 170 degrees, and the wind was from 180 degrees at five knots. The taxiway was 2,200 feet long with a ridge of snow close to the end used for an approach threshold.

The pilot misjudged his altitude and allowed the aircraft to touch down short of the intended landing area. On contact with the snow ridge, the nose gear collapsed.

FINDINGS:

Cause Related:

1. The aircraft landed short of the intended landing area and struck a ridge of snow.
2. The nose gear collapsed when it contacted the snow ridge.

Other:

-Nil-

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LONDON FLYING CLUB
PIPER PA-28-140 C-GDYC
LONDON AIRPORT, ONTARIO
25 MARCH 1985

REPORT NUMBER: 85-O/50022 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1029 EST
OPERATION: Flying Club Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	114	104
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was returning to the airport after a local visual flight rules (VFR) flight. The pilot was attempting to touch down as close to the threshold as possible in order to clear the runway at the first exit. As the aircraft approached the threshold, the pilot reduced the airspeed by raising the aircraft nose. The stall warning horn activated, and the pilot pushed the nose down. The aircraft touched down hard, and the left main gear and the nose gear broke off.

The aircraft landed hard because of improper control inputs during a precision landing attempt. The hard landing caused the landing gear to fail in overload. There were no pre-accident failures or malfunctions found.

FINDINGS:

Cause Related:

1. The aircraft landed hard because of improper control inputs, and the landing gear failed in overload.

Other:

- Nil -

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Aviation Occurrence Reports

HALIFAX FLYING CLUB
PIPER PA-28-151 C-GNWT
HALIFAX INTERNATIONAL AIRPORT, NOVA
SCOTIA
14 APRIL 1985

REPORT NUMBER: 85-A50007 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1522 AST
OPERATION: Flying Club Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	200	150
LAST 90 DAYS	.5	.5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was attempting his first solo landing after completing a dual circuit check with an instructor. The aircraft landed hard in a nose-down attitude and then bounced three times. Directional control was lost, and the aircraft swerved off the runway, coming to rest in the infield. The nosewheel was damaged during the hard landing.

The pilot had not flown for several months, and his medical had expired 14 days prior to the accident. The pilot stated that, during his dual check-out, he had been rounding out the aircraft too high; consequently, for this landing, he was attempting to modify the flare by rounding out at a lower height. However, he misjudged the height above ground and landed hard. The hard landing caused damage to the nosewheel, which, in turn, resulted in the loss of directional control.

FINDINGS:

Cause Related:

1. During the landing, the pilot misjudged the height above ground, which resulted in a hard landing and a loss of directional control.

Other:

1. The pilot's medical had expired 14 days prior to the accident.

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MILLARDAIR LTD.
DOUGLAS C54B-DC C-GQIA
HAMILTON CIVIC AIRPORT, ONTARIO
15 MAY 1985

REPORT NUMBER: 85-O50031 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1235 EDT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	13,000	400
LAST 90 DAYS	75	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	4
PASSENGERS	-	-	-

SUMMARY REPORT:

The captain of the aircraft and three trainee pilots were practising circuits at the Hamilton Airport. During a landing roll, the nose gear collapsed and the aircraft settled onto the runway in a nose-down attitude.

One of the trainee pilots was standing in the jump seat position and was acting as a third pilot. The jump seat was not installed in the aircraft. One of his duties was to raise the flaps from the landing to the take-off position during the rolling phase of touch-and-go landings. This action was to be executed without a specific command from the pilot flying the aircraft, as briefed during the before-landing briefings. On full-stop landings, no controls were to be moved until the aircraft had slowed to taxi speed. On the landing roll of the occurrence, which was briefed as a full-stop landing, the third pilot attempted to raise the flaps without positively identifying the flap lever. He inadvertently grasped the landing gear lever and selected the landing gear up rather than moving the flap lever. Since the weight of the aircraft had not yet settled onto the wheels, the landing gear safety switch on the main gear did not activate to lock the gear lever and prevent its movement. The nosewheel retracted, and the aircraft slid to a stop.

The pilot standing in the jump seat position was not strapped in as required by Air Navigation Orders.

FINDINGS:

Cause Related:

1. The third pilot did not confirm visually that he was actuating the flap lever.

2. The third pilot inadvertently raised the landing gear lever during the landing roll.

Other:

1. The third pilot was standing at the jump seat position and was not strapped in as required by Air Navigation Orders; the jump seat was not installed.

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LOYAL AIR LIMITED
PIPER PA-34-200 SENECA C-GSMD
PICTON AIRPORT, ONTARIO
19 JULY 1985

REPORT NUMBER: 85-O50056 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1450 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

	PILOT-IN COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
PILOT HOURS:				
TOTAL	17,000	1,000	280	20
LAST 90 DAYS	233	81	60	20
INJURIES:				
CREW	FATAL	SERIOUS	MINOR/NONE	
PASSENGERS	-	-	2	
	-	-	-	

SUMMARY REPORT:

The charter flight was on the take-off roll and approaching rotation speed, when the aircraft yawed to the left. The co-pilot was in the left-hand seat and was at the controls at the time. The co-pilot decided to reject the take-off; he reduced power immediately and began braking but was unable to stop the aircraft on the runway remaining. The aircraft overran the runway end and came to rest 170 feet beyond.

Examination of the left engine showed that the fuel injector nozzle on the number 4 cylinder was loose due to poor silver soldering at time of manufacture. This loose injector caused an interruption in the fuel flow to the engine resulting in a partial loss of power. This power loss in the left engine caused the aircraft to yaw to the left, and the co-pilot rejected the take-off.

The runway surface was dry, rough-textured asphalt, and the braking action was reported as good. Tire marks showed that braking started about 880 feet before the end of the runway. The marks were broken and light in-

dicating that braking was not constant nor heavy. The accelerated stop distance for this aircraft is about 1,860 feet, and the normal landing run is 705 feet. The total distance travelled after the first evidence of braking, about 1,060 feet, and the nature of the tire marks on the runway, are indications that maximum braking was not applied during the rejected take-off, and, as a result, the aircraft overran the runway.

FINDINGS:

Cause Related:

1. Due to poor soldering, a fuel injector nozzle on the left engine became loose, causing an interruption in the fuel flow to the engine and a partial loss of power.

2. The co-pilot in control did not use maximum braking during the rejected take-off and, as a result, the aircraft overran the runway.

Other:

- Nil -

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MONCTON FLYING CLUB
PIPER PA38-112 C-GBIC
MONCTON, NEW BRUNSWICK
26 SEPTEMBER 1985

REPORT NUMBER: 85-A50029 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0843 ADT
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	20	20
LAST 90 DAYS	20	20
INJURIES:		
CREW	FATAL	SERIOUS
PASSENGERS	-	-
	-	1
	-	-

SUMMARY REPORT:

The student pilot was on a solo training flight and was making an approach to runway 29 for his first landing of the day. There was a slight cross-wind from the right. The aircraft touched down hard, and the student lost directional control. The aircraft ground looped to the left and rolled approximately 200 feet off the runway. The landing gear struck ruts in the ground; the right

Aviation Occurrence Reports

main landing gear broke away, and the aircraft came to rest in an upright position.

The ruts in the ground had been made by a heavy vehicle when it drove over the infield while the ground was soft and wet. When the ground dried, these deep depressions remained.

The student had soloed three days prior to the accident. He had completed one of the two hours required for solo circuit flying, before resuming dual instruction. When the aircraft touched down hard, it started to ground loop, and, although the student applied opposite rudder, he did not use brake to assist in maintaining directional control. The ground loop was likely aggravated by the slight right cross-wind, and the inexperienced student was unable to regain directional control. The main landing gear struck the ruts at right angles, causing the gear to break.

FINDINGS:

Cause Related:

1. The student pilot lacked landing experience.
2. Following the hard landing, directional control inputs were inadequate in maintaining directional control.
3. The right main landing gear broke when it struck deep ruts in the ground.

Other:

- Nil -

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MONCTON FLYING CLUB
PIPER PA38-112 C-GRWC
MONCTON, NEW BRUNSWICK
22 OCTOBER 1985

REPORT NUMBER: 85-A50031 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0925 ADT
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	750	600
LAST 90 DAYS	100	70

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The instructor and student were on a training flight to prepare the student for a private pilot flight test. The instructor determined that the student had a tendency to flare the aircraft too high, which, in turn, resulted in hard landings. To show the student the consequences of flaring too high, the instructor demonstrated a high flare during a landing approach. Following this demonstrated manoeuvre, the pilot applied full power to initiate a climb; however, the aircraft descended in a nose-high attitude and struck the runway. The tail skid and the rear bulkhead sustained substantial damage.

During the demonstration, the airspeed was allowed to decrease until the aircraft was in a near-stalled condition. The application of full power was too late to accelerate the aircraft, stop the descent and regain the lift necessary to climb. The tail skid struck the runway with sufficient force to buckle the rear bulkhead.

FINDINGS:

Cause Related:

1. While demonstrating a landing approach with a high flare, the instructor delayed the recovery action until the aircraft was in a near-stalled condition.
2. The aircraft descended in a nose-high attitude, causing the tail skid to strike the runway.

Other:

-Nil-

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GUELPH AIR SERVICES 67 LIMITED
CESSNA 150M C-GGVI
GUELPH AIR PARK, ONTARIO
04 DECEMBER 1985

REPORT NUMBER: 85-O/50092 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1230 EST
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	776	290
LAST 90 DAYS	170	168

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The instructor and student departed from Guelph Air Park, Ontario, on a local training flight. The student was occupying the left seat and was in control of the aircraft. The flight was to be comprised of circuits to prepare the student for a first solo flight.

Three circuits were completed, and no mechanical difficulties with the aircraft were experienced. On the climb-out to commence the fourth circuit, and at approximately 250 feet above ground level, the engine (Continental O-250A48B) lost power. The instructor immediately took control of the aircraft, selected carburetor heat on, and initiated a 180-degree right turn back to the airfield.

While the aircraft was still in a right-wing-low attitude, it contacted the ground short of the airfield.

PERTINENT INFORMATION:

The aircraft was removed from the site and placed in an apron hangar. The engine was started and operated for a short period of time; no irregularities were found. No contamination was found throughout the fuel system.

After a loss of engine power on take-off, the Transport Canada Flight Training Manual states "pick a landing path which will require only minor changes in heading", and, as a rough guide, it states "a 180-degree turn can be successfully made from about 800 feet". The aircraft was within the airfield's boundary when the engine lost power, and the pilot felt that the terrain that lay directly ahead was not suitable for a forced landing. He estimated that the aircraft's altitude was sufficient to complete a right-hand turn and land safely on the airfield.

ANALYSIS:

The engine lost power for undetermined reasons.

The pilot underestimated the altitude required to execute a 180-degree turn. As a consequence, the aircraft struck the ground in a right-wing-low attitude.

FINDINGS:

Cause Related:

1. During the climb-out, the engine lost power for undetermined reasons.
2. The pilot underestimated the altitude required to execute a 180-degree turn back to the airfield.

Other:

-Nil-

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CESSNA 172N C-GGEW
ST-FREDERIC, QUEBEC
20 NOVEMBER 1983

REPORT NUMBER: 83-Q30079 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1515 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	53	35
LAST 90 DAYS	8	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	2	1

SUMMARY REPORT:

During the take-off roll, at an airspeed of between 25 and 50 knots, the left wing dropped. The pilot applied full right aileron but was unsuccessful in correcting the uncommanded roll. The aircraft became airborne and the left wing struck the ground. The aircraft crashed and came to rest in a nose-down position, 300 feet to the left of the runway; three occupants were seriously injured.

The wind was reported to be light. The investigation did not reveal any pre-accident aircraft malfunction or failure. The flaps were set at 10 degrees for take-off. The selection of 10 degrees of flap was not in accordance with the manufacturer's recommendations, but no direct correlation between the flap position and the loss of control could be made. The pilot lost control of the aircraft during the take-off roll and he was unable to regain control on the ground or after the aircraft became airborne.

FINDINGS:

Cause Related:

1. The pilot lost control of the aircraft during the take-off run.

Other:

1. The selection of 10 degrees of flap for take-off was not in accordance with the manufacturer's recommendations.

Aviation Occurrence Reports

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BEL-AIR LAURENTIEN INC.
CESSNA 310C C-FLEU
LAC À LA TORTUE AIRPORT, QUÉBEC
02 MAY 1984

REPORT NUMBER: 84-Q40020 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1900 EDT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Senior Commercial

PILOT HOURS:	PILOT-IN COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	8,000	150	900	1
LAST 90 DAYS	50	1	150	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The chief pilot, who was occupying the right seat, was checking out a new pilot on circuit procedures and landings. On the fifth circuit, the chief pilot simulated an engine failure, and the pilot continued for a simulated single-engine landing, delaying the gear and flap selections until the landing was assured. During the landing roll, the right wing began to drop, and the pilot applied power and took off. When the gear was selected up after take-off, the gear remained down; however, the gear down indicator light was out, indicating an unsafe condition. The crew decided to return to home base, and en route, they attempted to obtain a down indication using the emergency method, but these attempts were unsuccessful. During the landing roll at home base, the right main gear collapsed, and the aircraft swung to the right, colliding with another aircraft which was parked off the side of the runway.

Examination of the aircraft revealed that all the micro-switches and gear position lights were serviceable and that the landing gear motor circuit-breaker had popped. The inboard drive tubes on both main gear and the outboard drive tube on the right gear were bent, and the right actuator arm had moved beyond the gear motor micro-switch down limit.

Both pilots stated that they were unable to recall whether or not the landing gear position light had indicated that the gear was down and locked on the single-

engine landing. Also, the chief pilot had no recent experience on this aircraft type as he had not flown it for almost one year.

The type of bending on the landing gear drive tubes was indicative of that which would be caused by the application of a force on the tubes when the gear is not fully down and locked. When the landing gear was selected down just prior to the single-engine landing, there was insufficient time for the gear to fully extend prior to touchdown. In this situation, the landing gear motor would still have been working to extend the gear against the forces generated on the landing gear by the landing, a situation which caused the landing gear circuit-breaker to pop. The open circuit-breaker prevented retraction of the gear once the aircraft was airborne again. The damage caused to the right gear on this landing would have prevented full extension of the gear using the emergency method.

FINDINGS:

Cause Related:

1. The landing gear was extended too late in the approach to be fully extended before touchdown.
2. Because the drive tubes had been damaged during the previous touch-and-go landing, the right gear would not fully extend.
3. When the right main gear collapsed, the aircraft swerved off the runway and collided with a parked aircraft.

Other:

1. The chief pilot had not flown this aircraft type for almost one year.

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GOLDEN WEST AVIATION INC.
ROCKWELL INTERNATIONAL S2R C-GVVE
FORT SASKATCHEWAN, ALBERTA 4 mi S
23 JUNE 1984

REPORT NUMBER: 84-W40037 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0700 MDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,300	1,500
LAST 90 DAYS	70	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

While the aircraft was returning to base from an aerial spray operation, the engine lost power, and the pilot carried out a forced landing on a freshly cultivated field. Shortly after touchdown, the aircraft nosed over. Although the aircraft was substantially damaged, the cockpit area maintained its integrity. The pilot was uninjured; he was wearing a helmet and using the shoulder harness.

The field which was selected for the forced landing was cultivated and rough, but firm. On approach, full flap was lowered, but the aircraft attitude was not adjusted accordingly. As a result, the aircraft landed in a nose-low attitude, causing the windmilling propeller to dig in and the aircraft to nose over. The pilot had not flown this version of the aircraft before and had not taken an opportunity to complete a familiarization flight before undertaking the operation.

An examination of the wreckage showed that there was no fuel in the fuel system. Prior to the flight, the fuel gauges indicated three-quarters full for both tanks, and the pilot believed that he had adequate fuel on board. He did not dip the tanks to confirm the amount of fuel, nor did he refuel the aircraft. The pilot stated that he had decided to leave the field and return to base when the tanks indicated one-quarter full. Shortly after leaving the field, the engine stopped.

FINDINGS:

Cause Related:

1. The engine stopped because of fuel exhaustion.

2. The aircraft attitude was not adjusted when the flaps were lowered, and, consequently, the aircraft was landed in a nose-low attitude.

3. The pilot relied solely on the fuel gauges to calculate his fuel load.

4. The pilot did not familiarize himself with this particular version of the aircraft prior to the flight.

Other:

-Nil-

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AIR SPRAY (1967) LTD.
DOUGLAS B26-C CF-FIM
MORLEY, ALBERTA 3 mi S
13 JULY 1984

REPORT NUMBER: 84-W40045 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1057 MDT
OPERATION: Commercial Non-Revenue
DAMAGE: Destroyed
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,488	32
LAST 90 DAYS	32	32

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft departed Calgary en route to the Moose Mountain area to carry out a practice water bombing run. Upon reaching the practice area, the pilot contacted the bird dog pilot on the forestry frequency. After the initial radio contact, no other transmissions were made. When the pilot of a second aircraft arrived at the practice area, he found that the first aircraft had failed to show up. Witnesses in the area reported seeing an aircraft on fire spinning to the ground. The left wing of the aircraft was found at a gas well site. The remainder of the aircraft crashed into the trees approximately half a mile west of where the left wing had separated.

The investigation determined that the failure of the left wing was due to a progressive fatigue crack in the front, lower spar cap of the left wing. The fatigue crack progressed from a machining groove or cut across the spar cap approximately one-sixteenth of an inch deep. As the history of the aircraft could not be established,

Aviation Occurrence Reports

the origin of the machining cut could not be determined. Since the outboard edges of the cut are under a riveted section of skin, it is probable that the cut was made either during overhaul or manufacture.

The left wing and other parts found at the gas well site showed no evidence of any fire damage, and neither engine showed any sign of an in-flight fire. It can be concluded that any in-flight fire occurred after the left wing had failed.

The investigation could not definitely determine whether or not the wing failure was pilot induced. Department of Transport tests show that, in this aircraft type, there is a severe pitching-up moment when the load is dumped. This pitching-up moment is increased as the aircraft's speed is increased and as the amount of flap is decreased. If the pilot had inadvertently jet-tisoned the load, the pitch-up moment and resultant increased G loading could have caused the wing failure. A laboratory examination of the bomb door actuators showed that the doors were closed at impact.

The autopsy revealed that the pilot's blood-alcohol level at the time of the accident was 1.1 grams per litre. Although this amount of alcohol would have adversely affected his ability to fly the aircraft, it is not possible to determine whether this fact had any bearing on the cause of the accident.

The following laboratory reports were completed: LP 246/84 - Bomb Door Actuators; LP 247/84 - Drop Selector Switch; and LP 249/84 - Wing Spar Failure.

FINDINGS:

Cause Related:

1. The left wing was weakened due to a fatigue crack which initiated at a machining cut in the face of the forward lower spar cap.
2. The sequence of events during the flight, resulting in the wing failure, could not be determined.

Other:

1. The pilot's blood-alcohol level was 1.1 grams per litre.

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NORTHERN THUNDERBIRD AIR LTD.
BEECH D18S C-FBCD
GERMANSEN LANDING, BRITISH COLUMBIA
26 JULY 1984

REPORT NUMBER: 84-P40038 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 PDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Senior Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,800	350
LAST 90 DAYS	90	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

On arrival over Germansen Landing, the pilot circled the field once then decided to land on runway 26 with a 15-knot tail wind. During the landing roll, the aircraft ran off the end of the runway and travelled 500 feet before swinging into a shallow ravine on the left side of the overrun.

The gravel runway at Germansen Landing is 2,300 feet long and is oriented 260/080 degrees magnetic (M). The wind at the time of the accident was from 090 degrees M at 15 knots.

New brakes had been installed on the aircraft prior to the flight, and the pilot reported that there was a loss of braking efficiency during the landing roll.

Tire marks on the runway showed that the aircraft landed 800 feet beyond the runway threshold. Because of the downwind landing and the late touchdown, the pilot was not able to stop on the remaining runway.

FINDINGS:

Cause Related:

1. The pilot landed 800 feet past the threshold on runway 26 with a tail wind and, as a result, was not able to stop the aircraft on the remaining runway.

Other:

- Nil -

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KENN BOREK AIR LTD.
DHC-6-300 TWIN OTTER C-GBDR
TUKTOYAKTUK, NORTHWEST TERRITORIES 17
mi W
18 AUGUST 1984

REPORT NUMBER: 84-W40062 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0951 MDT
OPERATION: Specialty Aerial Photography and Survey
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

	PILOT-IN-COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	13,891	8,296	7,000	215
LAST 90 DAYS	150	96	150	30
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	2	
PASSENGERS	-	-	4	

HISTORY OF THE FLIGHT:

The aircraft had been chartered by a scientific group for the purpose of conducting a photographic survey of whales in the Beaufort Sea. Survey flights were being flown from Tuktoyaktuk, Northwest Territories.

Less than 10 minutes into the first flight of the day, shortly after the pilot had selected the wing fuel tanks on, both engines lost all power. The pilot ditched the aircraft into the sea about 17 miles from Tuktoyaktuk. All occupants escaped from the aircraft before it sank and were rescued by boat.

PERTINENT INFORMATION:

The aircraft was subsequently located on the sea bottom 30 feet below the water surface. Portions of the aircraft, including the left wing, had separated during the ditching. The aircraft, minus the left wing and engine, was raised from the water and moved to Tuktoyaktuk for examination.

Examination of the right engine found water in both the fuel control unit and high pressure filter. Laboratory analysis determined that this water was not salt sea water but fresh water. The left engine was not recovered.

The pilot and co-pilot had refuelled the aircraft from barrels on the evening prior to the accident. The barrels used to fuel the aircraft on this occasion were not segregated from the barrels used on previous occasions.

Examination of all the used barrels determined that all but one contained less than one cup of fuel; the remaining barrel contained about five gallons of fluid, three of which were water.

The fuel barrels used in the refuelling had been filled and sealed in 1981. They had apparently been stored outside in an upright position. The recommended practice is to store barrels on their sides with the bungs at the three o'clock and nine o'clock position to avoid standing water covering the bungs. The barrels were rolled to the aircraft immediately prior to refuelling, which would have resulted in the mixing of fuel and any water which had settled in the bottom of the barrel.

During the refuelling procedure, no filter capable of trapping water was used, nor was the fuel tested for water. An extension had been added to the stand-pipe of the refuelling pump, allowing the barrel to be completely drained. In addition, while the co-pilot was filling the main tank which feeds the right engine, the pilot was transferring this fuel from the main tank to both wing tanks using the cross-feed valve. Following refuelling, the aircraft tanks were not sampled for water contamination.

Both engines lost power when the aircraft was about 1,000 feet above the Beaufort Sea. Because of the low altitude, the crew had only enough time to turn into wind in preparation for a ditching. The wind was 240 degrees magnetic at 18 knots.

Following the ditching, the crew and four passengers inflated and boarded a life-raft which had been placed aboard the aircraft at the passengers' request. Despite a favourable sea, the raft was quickly swamped as a result of overloading. The raft had been designed for only four people. Transport Canada does not require that life-rafts be carried aboard this type of aircraft unless it is to be operated over water more than 300 miles from shore.

Although immersion suits had been brought aboard the aircraft by the passengers, they were not being worn when the power loss occurred and could not be donned prior to impact. A nearby helicopter was able to drop a larger life-raft shortly after the ditching. Difficulty was encountered in inflating this raft. After several unsuccessful attempts, the raft was inflated using alternate means. The crew and passengers were picked up about 45 minutes after boarding the raft.

No life-vests were carried on the aircraft, and none were required by regulation if the aircraft was to remain within 50 miles of land.

ANALYSIS:

The presence of fresh water in the fuel system of the right engine indicates that the engine lost power as a result of water-contaminated fuel. The refuelling technique allowed water to enter the fuel system supplying both the left and right engines; water was then transferred to the wing fuel tanks. When these tanks were selected after take-off to feed the engines, both engines lost power.

The occupants of the aircraft encountered difficulty with safety equipment following the ditching. The fact that safety equipment was carried on board, beyond that required by regulation, indicates that the possibility of a ditching had been considered. The immersion suits could not be donned prior to the ditching and therefore were not useful. Given the fact that the life-raft was inadequate for the number of survivors and no life-vests were available, it is fortunate that the occupants were rescued quickly.

The pilot turned into wind and successfully ditched the aircraft.

The following laboratory report was completed: LP 227/84 - Analysis of Fuel/ Water Samples.

FINDINGS:

Cause Related:

1. The fuel was stored in a manner conducive to water contamination.
2. Adequate precautions were not taken to ensure that water was not pumped into the aircraft fuel system.
3. The independent nature of the left and right engine fuel systems was overridden during the refuelling.
4. Both engines failed as a result of water contamination of the fuel.

Other:

1. The life-raft carried aboard the aircraft was inadequate for the number of persons on board the aircraft.
2. Difficulty was experienced in inflating a second raft air-dropped by helicopter.
3. No life-vests were carried on the aircraft, and none were required by regulation.

SAFETY ACTION:

Action Taken:

The subject of safety deficiencies relating to life-raft standards, maintenance, and inspection has been vigorously pursued by the CASB. As a result of a CASB study on life-rafts, Recommendations 85-17, 85-18, and 85-19 were issued to address deficiencies similar to those discovered in this occurrence. These Recommendations are repeated below:

The Department of Transport amend ANO Series II, No. 8 to clearly prescribe the technical and performance standards for the manufacture and maintenance of life-rafts in Canada. These revised standards should clearly establish the minimum standards applicable to any life-rafts subject to any "grandfather clauses" in the revised ANO, and should include the requirement to mark the dates of design-approval and manufacture on a life-raft;

(CASB 85-17)

The Department of Transport strengthen its certification and inspection procedures to ensure continuing compliance with the minimum technical and performance standards throughout the in-service life of a life-raft;

(CASB 85-18)

and

The Department of Transport define minimum standards for the certification and inspection of life-raft storage cases, comparable to those minimum standards applying to the life-rafts; such standards must make provision for the effective deployment of the raft under emergency conditions.

(CASB 85-19)

Also, on 20 March 1985, an S61 helicopter was forced into a controlled ditching in the Atlantic Ocean, and similar deficiencies associated with life-rafts were noted. Two additional Recommendations (86-30 and 86-31) were issued in March 1987. These latest Recommendations, which are currently under review by Transport Canada, are repeated below:

The Department of Transport amend the Engineering and Inspection Manual to include more specific standards and controls for the inspection of life-rafts used on Canadian aircraft;

(CASB 86-30)

and

The Department of Transport strengthen the audit procedures for centres approved by the Department of

Transport for the overhaul of life-rafts used on Canadian aircraft.

(CASB 86-31)
09/04/87

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GRONDIN TRANSPORTS INC.
PIPER PA-23-250 AZTEC C-FPHB
IVUJIVIK, QUEBEC
22 SEPTEMBER 1984

REPORT NUMBER: 84-Q40076 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1500 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,394	101
LAST 90 DAYS	191	88

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

After overflying the destination airfield and noting a stationary aircraft at the threshold of runway 08, the pilot decided to land on runway 26. A few seconds after the main wheels touched down, the nose gear collapsed. The aircraft nosed down and continued for about 200 feet before coming to rest tail up.

Laboratory examination revealed that the nose gear fork clamp and the nosewheel rims failed in overload. A topographical analysis found a rise in the ground just before the threshold of the 1,500-foot gravel runway which is roughly marked by wooden boards. The load carried by the aircraft brought the gross weight to the maximum permitted.

The pilot attempted to land short because of the aircraft's high weight, the presence of another aircraft at the end of the runway, and the short available landing distance. Before the wheels touched, the nosewheel struck the rise in the ground close to the runway threshold. This impact caused the nose gear clamp to fail such that it could no longer hold the gear strut in position. The nose gear would not sustain the weight of the aircraft, and it collapsed.

The following laboratory report was completed: LP 353/84 - Nose Gear Fork.

FINDINGS:

Cause Related:

1. The pilot attempted a short landing because of the aircraft's high weight, the presence of another aircraft parked at the end of the runway, and the short available landing distance.
2. During the short final approach, the nosewheel struck a rise in the ground, and the nose gear clamp failed.
3. The nose gear collapsed after the wheels touched down because of the failure of the clamp.

Other:

-Nil-

→ → → → →

STEWART LAKE AIRWAYS LTD.
DE HAVILLAND DHC-2 C-FMAT
STEWART LAKE, ONTARIO 40 mi N
25 OCTOBER 1984

REPORT NUMBER: 84-C40036 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 CDT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,000	4,000
LAST 90 DAYS	80	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The float-equipped aircraft was en route to a remote lake. Thirty miles from the departure point, the pilot flew into an area of freezing rain, and shortly thereafter, the aircraft iced up and began to descend. A forced landing was attempted on a small lake. On final approach, the aircraft stalled and struck the surface of the lake with the left wing, causing the wing to separate from the fuselage at the attachment points.

There was no evidence to indicate that the aircraft was unserviceable at the time of the accident.

Aviation Occurrence Reports

The aircraft was flown through an area of freezing rain, which caused heavy airframe icing. It is likely that the ice accumulation was sufficient to cause the aircraft to lose altitude and the pilot to carry out a forced landing. Freezing rain had been reported by the weather office in the area of operation; however, the pilot had not obtained a weather briefing prior to the flight.

FINDINGS:

Cause Related:

1. The aircraft was flown through an area of freezing rain which caused heavy airframe icing.
2. Freezing rain had been reported by the weather office in the area of operations; however, the pilot had not obtained a weather briefing prior to the flight.

Other:

-Nil-

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FLIGHT CENTRE VICTORIA
MITSUBISHI MU-2B-35 C-FROM
ENDERBY, BRITISH COLUMBIA 60 mi NE
25 OCTOBER 1984

REPORT NUMBER: 84-P44013 (Incident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0110 PDT
OPERATION: Charter
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	Unknown	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was cruising at 19,700 feet on a night cross-country flight over mountainous terrain, when cloud was encountered and ice began to build up on the aircraft. When the accumulation of ice could not be controlled, the pilot reversed heading to proceed to an alternate airport. The aircraft began to lose altitude as ice built up on both engine inlets and the engine torque decreased. The left engine flamed out and was feathered at 15,000 feet, and the rate of descent increased to 2,300 feet per minute with an airspeed of 130 knots.

As the aircraft continued its descent through the severe icing conditions, the right engine lost power, and the rate of descent increased to 4,000 feet per minute. When the aircraft descended through the freezing level at approximately 10,000 feet, the ice began to dissipate and fall from the aircraft. At 7,000 feet, the left engine was restarted, and the rate of descent was reduced to 1,100 feet per minute. At that point, the aircraft was below high ground in the vicinity, and radar vectors were given by air traffic control (ATC) to keep the aircraft in a valley. At 3,500 feet above sea level, 2,000 feet above the valley floor, the right engine was restarted, and an immediate climb initiated. The aircraft proceeded to the alternate airport where an uneventful landing was completed. A subsequent base inspection revealed bent compressor blades on the right engine.

The aircraft was certified for flight in icing conditions. The pilot stated that he had turned on the anti-ice / de-ice systems before the icing conditions were encountered.

When ice began to accumulate on the aircraft, the pilot observed ice building on the engine air inlets. Service Bulletin SB196A and Airworthiness Directive AD 84-12-04 had not been complied with. These documents described the required rectification needed to prevent the engine inlet anti-ice systems from losing their effectiveness in the advent of ice buildup.

The pilot received a verbal weather briefing from a briefer at the Vancouver weather office for a planned flight departure of 0400Z (Coordinated Universal Time). Because of poor forecast weather at destination the flight was delayed and departed at 0720Z. One of the forecasts available to the pilot issued at 2340Z on 24 October 1984 and valid from 0000Z to 1200Z on 25 October 1984 indicated that cloud tops would be up to 18,000 feet with at least one layer based at or above 20,000 feet, and there would rime or mixed icing in cloud, except occasional heavy clear icing in convective clouds. The next forecast, issued at 0530Z on 25 October and valid from 0600Z to 1800Z, indicated cloud layers to 24,000 feet with moderate icing in cloud. The weather information obtained by the pilot indicated cloud tops at 16,000 feet, but this applied only to the first portion of the flight. The pilot understood that there would be no cloud above 16,000 feet, and therefore did not anticipate any problem associated with clouds and icing as he planned to cruise at Flight Level 210.

Although SB196A and AD 84-12-04 had not been complied with, it was determined that the anti-ice systems of the aircraft were operating properly. The pilot stated that he observed ice accumulating on the engine air inlets although the anti-ice / de-ice systems were turned on before encountering icing conditions. According to the aircraft manufacturer, a properly functioning engine air

inlet anti-ice system would have been able to cope with such icing conditions. It could not be determined why the anti-ice systems could not prevent ice formation on the engine air inlets. The ice reduced and disrupted air flow to the engines, causing both engines to lose power. Compressor blade damage on the right engine, likely caused by ice ingestion, could have accounted for the difficulty in restarting that engine.

FINDINGS:

Cause Related:

1. The pilot did not have the necessary weather information required to plan the flight.
2. The aircraft's anti-icing systems did not prevent ice buildup for undetermined reasons.

Other:

1. The ATC personnel were instrumental in the successful recovery of the aircraft.
2. SB196A and AD 84-12-04 had not been complied with.

The information supplied by the pilot in this report is released in the interest of aviation safety in accordance with Section 28(3) of the CASB Act.

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CONQUEST AVIATION
PIPER PA-28-181 CHEROKEE C-GBUF
MAYBERLY, ONTARIO
06 NOVEMBER 1984

REPORT NUMBER: 84-040076 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1200 EST
OPERATION: Flying Club Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	830	503	
LAST 90 DAYS	7	6	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The Piper Cherokee took off from Ottawa, Ontario on a visual flight rules (VFR) flight to St. Catharines. About

30 minutes after take-off, snow showers were encountered. The pilot descended, altered course slightly to follow a highway, and continued to St. Catharines. A short time later, the pilot saw another band of snow showers on the aircraft's flight path. The airspeed was reduced, and the aircraft descended to about 500 feet above ground level. Because the visibility was decreasing, the pilot decided to return to Ottawa. While in the turn, the visibility was reduced to almost zero. On completion of the turn, the pilot noted that the low cloud and snow had moved along the aircraft's return flight path.

The pilot then decided to carry out a precautionary landing in a nearby field and attempted to contact Ottawa flight services. Unable to do so, she broadcast a MAYDAY message on 121.5 megahertz and then decided to land uphill with a light tail wind and to approach the touchdown point over the least obstructed area.

On final approach, the engine power was set at idle. The aircraft touched down about one-third to one-half the distance along the intended landing area. At touchdown, the pilot applied brakes, and as the aircraft rolled onto some soft ground, the nosewheel dug into the soil, and the nose gear collapsed.

Several factors contributed to the aircraft touching down about half-way along the intended landing area. Water droplets had begun to accumulate on the windscreen. The size and number of water droplets combined with the curvature of the windscreen can cause an optical distortion which can make it difficult to judge the height above ground. In addition, the upsloping terrain can result in an optical illusion causing the pilot to misjudge the approach height. Furthermore, a downwind landing results in a ground speed which is faster than the actual indicated airspeed. Thus the pilot approached the landing point too high, and when the aircraft was flared, it floated for a considerable distance before touchdown occurred. Braking was adversely affected by the wet grass on the field.

Prior to departure from Ottawa, the pilot checked the area and terminal forecasts by telephone. The forecasts were for VFR weather with a chance of isolated snow showers along the route. When the pilot encountered the second line of showers, she could not fly around them. At that point, because the low ceiling and reduced visibility surrounded the pilot in all directions, she had no alternative but to land as she was not instrument rated.

Aviation Occurrence Reports

FINDINGS:

Cause Related:

1. After encountering unexpected snow shower activity en route, the pilot made a precautionary landing in an unprepared field.
2. The aircraft was flared too high over the touchdown area.
3. During the landing, touchdown was not achieved until the aircraft was half-way down the intended landing area.

Other:

-- Nil --

→ → → → →

AUSTIN AIRWAYS LTD.
CESSNA CITATION 500 C-GRQA
SIOUX LOOKOUT, ONTARIO
15 DECEMBER 1984

REPORT NUMBER: 84-C40095 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1830 CST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
PILOT HOURS:				
TOTAL	3,700	2,000	2,800	480
LAST 90 DAYS	90	90	130	20
INJURIES:				
CREW	FATAL	SERIOUS	MINOR/NONE	
PASSENGERS	-	-	3	

HISTORY OF THE FLIGHT:

The aircraft was being operated on a medical evacuation flight to transport a two-year-old patient to Sioux Lookout. Following a missed approach, the crew attempted another landing on runway 34. The aircraft landed on the second attempt but could not be stopped on the runway, and it came to rest 200 feet past the 300-foot stopway. The nose and left main landing gear were damaged when the aircraft struck a drainage ditch. The main left gear also punctured the upper wing surface when it was driven upward by the impact. The oc-

cupants of the aircraft, including the patient who was held in an attendant's arms, were uninjured.

PERTINENT INFORMATION:

Runway 34 at Sioux Lookout is 4,200 feet long by 100 feet wide and has an average downslope of 0.5 per cent. At the time of the accident, the reported visibility was one mile in light freezing rain and fog with an obscured overcast ceiling of 500 feet above ground. The wind was from 170 degrees at two knots. The Citation crew was advised by the flight service station (FSS) that freezing rain was falling and warned that the runway was probably slippery.

A James Brake decelerometer was available at the airport. This equipment provides an indication of runway braking action which is given as a James Brake Index (JBI). The JBI is measured by ground personnel and relayed to flight crew. No JBI was measured before the Citation attempted to land, and the flight crew did not request that this measurement be taken. The runway had not been urea treated. The Citation crew was aware that a Piper Navajo had landed on the same runway about 35 minutes earlier and that this other aircraft crew had reported good braking action.

The only straight-in instrument approach at Sioux Lookout was a non-directional beacon (NDB) approach to runway 34. The published minimum descent altitude (MDA) for the approach was 1,840 feet above sea level or 586 feet above the airport elevation; the published visibility minimum was one and three-quarter miles. The inbound track was offset from the runway heading by 15 degrees. The crew overshot from the first approach when they could not see the runway environment in time to land, and they decided to attempt another approach. The approaches were flown by the first officer; the captain took control and landed the aircraft following the second approach. Witnesses on the ground reported that the aircraft landed about 2,000 feet from the threshold of runway 34, and the aircraft was observed turning just prior to touchdown.

The speed brakes were inoperative when the aircraft was dispatched and hence not available. Speed brakes have a very minor effect on the landing roll distance.

According to the manufacturer's Model 500 Operations Manual, the landing distance on an ice-covered runway with thrust reversers applied would be approximately 2,900 feet. After the aircraft touched down 2,000 feet past the runway threshold, it covered a ground distance of 2,900 feet before coming to a stop.

ANALYSIS:

Because of the freezing precipitation, the runway surface had become very slippery and the braking action was almost nil. Although the Citation crew had been informed of the freezing precipitation and of the probable slippery condition of the runway, they did not ask for a JBI measurement and instead relied on a pilot's braking action report passed 35 minutes earlier. The aircraft touched down 2,000 feet passed the threshold; as a result, 2,200 feet of runway remained on which to stop the aircraft. Because the required landing distance in the prevailing conditions was 2,900 feet, the aircraft continued passed the runway end during the roll-out.

FINDINGS:

Cause Related:

1. Braking action was extremely poor because of freezing precipitation on the runway.
2. A JBI measurement was not taken before the aircraft landed, and the crew relied on a pilot's report given 35 minutes previously.
3. Because the aircraft touched down 2,000 feet down the runway, it could not be stopped in the remaining landing distance available and continued passed the runway end during the roll-out.
4. The speed brakes were inoperative when the aircraft was dispatched and hence not available.

Other:

1. The runway conditions were below standard for aircraft operations.

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CESSNA 337 CF-GGL

HAY RIVER AIR SERVICES LTD

FORT SIMPSON, NORTHWEST TERRITORIES 1 mi E

23 JANUARY 1985

REPORT NUMBER: 85-W50005 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1905 MST

OPERATION: Commercial Non-Revenue

DAMAGE: Destroyed

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,172	70
LAST 90 DAYS	145	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft departed from runway 12 at Fort Simpson on a night visual flight rules (VFR) trip to Hay River. After take-off, there was no communication with the aircraft, and, when it failed to arrive at its destination, a search was conducted. The aircraft was found approximately one mile east of the airport in an area where a witness reported seeing colored lights descending at a steep angle.

Examination of the wreckage revealed that the aircraft was heading in a westerly direction and descending at an angle of 15 degrees nose-down, when it struck the ground. There was no evidence to suggest that an in-flight break-up had occurred and both the flaps and gear were up at impact. Laboratory analysis of the engines show that both engines were operating at the time of impact.

The weather was not considered to be a contributing factor in this accident. The pilot had just completed a flight along the route and another company pilot who had accompanied the pilot on that flight reported that the weather was suitable for VFR operations.

The aircraft was last observed climbing off runway 12 in a wings-level attitude. A left turn toward Hay River was required, and the evidence suggests that aircraft control was lost during the turn, possibly due to spatial disorientation as a result of a lack of references while on the night flight.

The following laboratory reports were completed: LP 28/85 - Instrument Readings; and LP 32/85 - Exhaust System Analysis.

Aviation Occurrence Reports

FINDINGS:

Cause Related:

1. Aircraft control was lost for undetermined reasons.

Other:

- Nil -

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VOYAGEUR AIRWAYS LTD.
CESSNA 172M C-GNVY
SOUTH RIVER, ONTARIO 2.5 mi W
6 FEBRUARY 1985

REPORT NUMBER: 85-O50005 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1045 EST
OPERATION: Specialty Aerial Inspection, Reconnaissance
and Advertising
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	760	140
LAST 90 DAYS	100	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

While conducting a low level survey of the moose population for the provincial Ministry of Natural Resources, the aircraft mushed into tree-covered rising terrain.

An examination of the aircraft did not reveal any evidence of mechanical failure that would have contributed to the cause of the accident. The flaps were found extended approximately 10 degrees.

The investigation established that to facilitate the observers' work, the pilot was flying low passes at about 50 feet toward rising terrain. It was reported that the stall warning horn was heard regularly during this operation. According to the aircraft owner's manual, with 10 degrees of flap extended, the aircraft should be flown at an airspeed of 65 mph for the best angle of climb. The evidence indicates that if the airspeed was allowed to drop below the recommended airspeed, the climb performance would not have been sufficient to climb over the rising terrain.

FINDINGS:

Cause Related:

1. Low level, low speed passes were conducted toward rising terrain for observation purposes.
2. The evidence indicates that the airspeed decayed below the recommended best angle of climb speed.
3. Because of the reduced angle of climb, the aircraft was unable to climb over the rising terrain.

Other:

- Nil -

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NEWFOUNDLAND LABRADOR AIR TRANSPORT
DE HAVILLAND DHC2 C-FLPF
FORTEAU, LABRADOR
14 FEBRUARY 1985

REPORT NUMBER: 85-A50002 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1410 NST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commerical

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,500	2,000
LAST 90 DAYS	80	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot encountered freezing rain while flying at 1,500 above ground level (agl). He elected to continue to his destination; however, due to ice accumulation on the aircraft and strong winds and downdrafts near his destination, he realized that the aircraft would not be able to climb and clear high terrain. The pilot decided that it would be unsafe to continue and chose instead to land on a highway. The aircraft touched down on the ice-covered road and slid into the right-hand ditch.

The pilot did not receive a briefing from the nearest flight service station (FSS) specialist; however, he was aware through weather reports from other pilots in the area that the weather was deteriorating. The pilot felt there was sufficient time to complete the flight before the freezing rain was encountered.

FINDINGS:**Cause Related:**

1. The pilot flew into forecast freezing rain.
2. The area selected for a precautionary landing was ice covered, and the pilot was unable to maintain directional control.

Other:

-Nil-

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FUNDY AVIATION LTD.
PIPER PA-28-140 C-FZJO
CHARLOTTETOWN, PRINCE EDWARD ISLAND
17 MARCH 1985

REPORT NUMBER: 85-A50004 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1217 AST
OPERATION: Specialty Recreational Flying
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	60	2	
LAST 90 DAYS	6	2	

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft landed at its destination after a visual flight rules (VFR) cross-country flight. The initial touchdown was hard, and the aircraft bounced. The pilot pushed the control column forward, and the aircraft hit the runway again, this time with sufficient force to detach the nosewheel. The aircraft then slid to a stop on the runway.

Although the pilot had flown a PA-28-151, this was his first flight in a PA-28-140. Because of differences in wing structure, the two aircraft have different landing characteristics. During the landing phase, the aircraft did not float the way the pilot expected it to, and, after the aircraft bounced, the required bounce recovery technique was not used.

FINDINGS:**Cause Related:**

1. The aircraft bounced after touchdown and the required recovery technique was not used.

Other:

-Nil-

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SKYCHARTER
GATES LEAR JET 25B C-GSAS
TORONTO/LESTER B. PEARSON
INTERNATIONAL AIRPORT, ONTARIO
03 APRIL 1985

REPORT NUMBER: 85-O/54045 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0410 EST
OPERATION: Charter
DAMAGE: Minor
PILOT LICENCE: Airline Transport

	PILOT-IN-COMMAND		CO-PILOT	
PILOT HOURS:	ALL	ON	ALL	ON
	TYPES	TYPE	TYPES	TYPE
TOTAL	10,400	3,500	9,500	2,000
LAST 90 DAYS	130	130	130	130

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was completing a night charter flight from Indianapolis to Toronto under instrument flight rules. At Toronto, the pilot flew a manual instrument landing system (ILS) approach to runway 06R in light snow. The aircraft touched down on the left side of the runway and gradually diverged from the centre line until it struck runway lights and came to rest in the infield area to the left of the runway.

At the time the flight crew obtained their approach clearance, the arrival controller passed them a one-hour-old weather observation which indicated a 500-foot precipitation ceiling with one mile visibility in light snow. The automatic terminal information service (ATIS) broadcast at the same time did not contain the latest weather observation as required by the Air Traffic Service Manual of Operations (MANOPS), and it gave an erroneous runway condition report which was over three hours old. The pilot had previously received the

Aviation Occurrence Reports

latest available weather observation from other controllers. The crew listened to the ATIS broadcast. The runway visual range (RVR) at the time of the occurrence had fallen to between 4,500 to 5,000 feet, but this information was also not passed to the flight crew as required by MANOPS.

The tower advised the crew that approach lights and runway edge lights were set at maximum intensity and could be reduced if desired. The pilot did not request a reduction in intensity, and he conducted the landing with the aircraft landing lights on. The pilot experienced difficulty orienting himself visually with the runway during the touchdown and roll-out. The runway itself was thinly covered with snow but still clearly discernable from the surrounding infield.

Flight data recorder analysis showed that the pilot made one correction towards the runway centre line prior to touchdown but then allowed the aircraft to diverge from the centre line until it left the runway.

The pilot's perception of the runway environment was degraded by the glow and reflections created by the airfield and aircraft lights shining on the snow.

FINDINGS:

Cause Related:

1. The flight crew did not receive, nor did they request, the latest runway condition reports or the current RVR.
2. The high intensity of the runway lighting combined with the aircraft landing lights created visual orientation problems for the pilot during the touchdown in snow.
3. The aircraft touched down to the left of the runway centre line and was allowed to travel off the left side of the runway.

Other:

1. The ATIS broadcast at the time of the occurrence did not contain weather information as required by MANOPS.

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PIPER PA-31-310 NAVAJO N87TS
WINDSOR AIRPORT, ONTARIO 8 mi E
12 APRIL 1985

REPORT NUMBER: 85-O50902 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,500	3,000
LAST 90 DAYS	120	120

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The cargo flight departed at 1105 eastern standard time on a four-leg trip with three short delivery stops. During the first stop, the engines were shut down for approximately 20 Minutes; however, during the subsequent two stops, the engines were kept running. The aircraft was not refuelled during any of these stops. At 1558, the aircraft departed Detroit City Airport on the fourth leg of the trip. At approximately 1620, the right engine surged and stopped. The pilot turned back towards Detroit, and, shortly thereafter, the left engine also stopped. All attempts to restart the engines were unsuccessful, and the pilot carried out a wheels-up forced landing on a ploughed field.

The engines stopped when the aircraft's fuel supply was exhausted. The pilot stated that he had checked the fuel gauges before departing on the fourth leg of the trip but could not recall what they were reading. He did not accurately compute either the fuel remaining in the aircraft or the fuel required for the last leg of the trip. At the time of the accident, the pilot's wife was ill in hospital, and he was anxious to return home as soon as possible.

The aircraft engines had been operating for 4 hours and 55 minutes before the loss of power occurred. During this time, there had been four take-offs and the associated climbs to altitude. The aircraft had an endurance of five hours at normal cruise power.

The pilot stated that he was preoccupied with his wife's condition and either misread the fuel gauges prior to the final departure or miscalculated the fuel required for the fourth leg of the flight.

FINDINGS:

Cause Related:

1. The pilot misjudged the fuel required for the flight, and the aircraft ran out of fuel.

2. The pilot was preoccupied with his wife's condition and was anxious to return home.

Other:

- Nil -

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GRONDIN TRANSPORT
BRITTEN-NORMAN BN-2A C-GJRL
KANGIRSUK, QUEBEC
01 APRIL 1985

REPORT NUMBER: 85-Q54045 (Incident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1700 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,330	600
LAST 90 DAYS	190	190

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The twin-engined aircraft had landed on the ice runway at Kangirsuk, and the passengers had disembarked. The pilot restarted the engines in order to park the aircraft on an apron beside the runway and connected to it by a partly cleared taxiway. The pilot observed a snow-drift across the taxiway and increased power in order to gain speed and pass through this obstacle. The aircraft penetrated the obstacle then stopped abruptly with a snapping sound. The pilot got out to assess the damage and noted that the right main gear was partly torn loose and was bent 45 degrees backwards.

The aircraft had struck a ridge of very hard frozen snow at a speed sufficient to cause damage to the upper wing surfaces perpendicular to the gear struts as well as the partial separation of the right main gear.

The gear struts are cantilevered below this high-wing aircraft, and each forms a lever of considerable length, thus increasing the stress exerted on the structure.

The pilot was relying on momentum to pass through the obstacle; however, he had not anticipated the possibility that the wheels would be suddenly stopped by an obstacle more resistant than the aircraft structure.

FINDINGS:

Cause Related:

1. The pilot attempted to taxi the aircraft quickly through what he believed to be a snow-drift but which proved to be a very hard ridge of frozen snow; as a result, the wheels were suddenly stopped, and the aircraft was substantially damaged.

Other:

-Nil-

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AIR SAGUENAY
DE HAVILLAND CANADA DHC-2, BEAVER
C-FKRJ
GRAND LAC, SAINTE ROSE-DU-NORD,
QUEBEC
17 APRIL 1985

REPORT NUMBER: 85-Q50009
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1832 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,717	2,900
LAST 90 DAYS	66	49

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was climbing after take-off from a frozen lake 5,000 feet in length, when the engine sputtered at about 300 feet above ground level. The pilot throttled back and landed the aircraft on the lake. The aircraft could not be stopped in the remaining distance and at about 20 mph, it struck some trees on the shoreline.

The investigation established that the rugged surrounding area was unsuitable for an emergency landing. On the frozen surface of the lake, the brakes of the wheeled

Aviation Occurrence Reports

aircraft were almost completely ineffective. The cause of the engine sputtering could not be determined.

The pilot, who had reason to doubt the condition of his engine, preferred to land on an open area rather than risk an engine stoppage above rugged ground. Because of the slippery surface, the aircraft could not be stopped in the remaining distance available on the lake.

FINDINGS:

Cause Related:

1. Because of the engine sputtering, the pilot landed the aircraft on the lake he had just left in order to avoid the risk of an engine stoppage above rugged ground.

2. The cause of the engine sputtering could not be determined.

3. Because of the slippery surface, the aircraft could not be stopped in the remaining distance available on the lake, and it struck some trees on the shoreline.

Other:

-Nil-

→ → → → →

HUNT RIVER CAMPS LIMITED
CESSNA A185E C-GLFT
GOOSE BAY AIRPORT, NEWFOUNDLAND
31 MAY 1985

REPORT NUMBER: 85-A50012 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1600 ADT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,000	5,000
LAST 90 DAYS	100	100

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft had departed Goose Bay Airport on a ferry flight to Stephenville, Newfoundland. After take-off, the engine started to run rough, and the pilot elected to return to Goose Bay. On the landing roll, just after the tail wheel contacted the runway, the aircraft veered

sharply to the right and ground looped. The aircraft then tipped to the left, damaging the left wing and elevator.

The investigation revealed that the left tail wheel steering cable spring had become detached in flight, because one of its attachment clips had not been properly secured during installation. As a result, the right-hand spring pulled the tail wheel around, causing the aircraft to veer to the right on touchdown. The investigation also established that a failed left magneto had caused the engine to run rough. The magneto failed because of a broken impulse coupling spring. The cause of the broken coupling spring could not be determined.

FINDINGS:

Cause Related:

1. An improperly installed attachment clip on the tail wheel steering assembly allowed the left cable spring to become detached in flight, causing the aircraft to ground loop on touchdown.

Other:

1. The impulse coupling spring in the left magneto broke in flight for undetermined reasons, causing the engine to run rough.

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BRUNSWICK AIR SERVICES LTD.
PIPER PA-25-235 C-FPKG
BATHURST, NEW BRUNSWICK 1 mi SE
5 JUNE 1985

REPORT NUMBER: 85-A50014 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1940 ADT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,800	1,200
LAST 90 DAYS	17	17

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was engaged in a spruce budworm spray operation. The pilot reported that the engine (Lycoming O-540-B2B5) lost power while on initial climb-out. The

pilot was unable to regain power, so he dumped the load of insecticide and force-landed into trees.

Although a detailed examination of the engine and accessories was completed, the investigation did not reveal the cause of the reported power loss. The engine operated normally under all conditions when it was run on a test stand. The possibility of carburettor icing was considered; however, atmospheric moisture conditions were not conducive to icing.

FINDINGS:

Cause Related:

1. The cause of the reported engine power loss could not be determined.

Other:

- Nil -

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LES ARROSAGES AERIENS CASTOR INC
SCHWEIZER G-164B C-GRWZ
RIMOUSKI, QUEBEC
08 JUNE 1985

REPORT NUMBER: 85-Q50024 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 2115 EDT

OPERATION: Speciality Aerial Application and Distribution

DAMAGE: Substantial

PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,870	20
LAST 90 DAYS	21	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The agricultural spray aircraft, the tail member of a formation of four aircraft, was returning to Rimouski as night fell. The sky was partly covered with high broken cloud, and the visibility was 30 miles. The pilot was following the navigation light of the aircraft ahead of him. On reaching the vicinity of the Rimouski Airport, the three leading aircraft made a base leg turn which was not observed by the pilot of the tail aircraft, who lost sight of the lights of the aircraft ahead of him and did not see the airport. After a few seconds, the pilot, uncertain of his position and worried about his low fuel level

and the approaching nightfall, decided to make a precautionary landing in a field. On rounding out, the pilot did not pull up sufficiently as the speed decreased, and the wheels touched when the aircraft was still travelling at high speed. After the initial contact, the aircraft bounced several times. The pilot pushed on the column, and the aircraft nosed down. The propeller dug in, and the aircraft overturned.

The pilot did not know the area, nor did he have a map of the location being overflown. The portable radio he had on board was not operational. The aircraft was not equipped with the interior and exterior lights required for night flying, and there was no flashlight on board. Visibility through the windshield had been considerably reduced by splashes from the product being sprayed.

The pilot was not informed of the approach to the airport and the base leg turn because there was no radio communication. He lost the formation because of the poor light at dusk and the poor visibility through the dirty windshield. As he had no map and did not know the area, the pilot was unable to determine his position in order to find the airport when he lost the formation. Since the aircraft was not equipped for night flying and the fuel level was low, the pilot could not spend time looking for the airport and was committed to making a night landing in the field. Because of the poor light conditions at the time of landing, the pilot's spatial perception was distorted, and, as a result, the aircraft touched down at high speed and bounced. The pilot pushed on the column in order to keep the aircraft on the ground. As a result of the pitch-down attitude, the propeller struck the ground, and the aircraft overturned.

FINDINGS:

Cause Related:

1. Because there was no radio communication, the pilot was not informed of the approach to the airport and the base leg turn.
2. Because of the poor light and poor visibility through the dirty windshield, the pilot lost sight of the formation.
3. Since he had no map and did not know the area, the pilot was unable to determine his position.
4. As the aircraft was not equipped for night flying and the fuel level was low, the pilot was unable to spend time looking for the airport and was forced to make a precautionary landing in a field.
5. Because of the poor light, the pilot's spatial perception was distorted.

Aviation Occurrence Reports

6. The aircraft bounced because it touched down at high speed.

7. The pilot pushed on the column in order to keep the aircraft on the ground, the propeller struck the ground, and the aircraft then overturned.

Other:

-Nil-

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PZL-M-18 DROMADER N4676C

SULLY, QUEBEC 1 mi E

09 JUNE 1985

REPORT NUMBER: 85-Q50903 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1700 EDT

OPERATION: Specialty Aerial Application

DAMAGE: Substantial

PILOT LICENCE: Commercial (U.S.A.)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,000	190
LAST 90 DAYS	35	35

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The M18 Dromader sprayer aircraft was under contract with the State of Maine, Department of Conservation, Budworm Forest Service. The aircraft took off on an easterly direction from a small airstrip located on the U.S. side of the St-Francois River, across from Sully, Quebec. Shortly after take-off, the pilot initiated a shallow left turn to await another aircraft taking off behind. The aircraft was not able to climb over a small tree-covered hill and crashed at low airspeed into the side of the hill.

PERTINENT INFORMATION:

The ceiling and visibility were unlimited, and a slight breeze was present. The pilot reported no mechanical, airframe or engine problems, although the aircraft "felt" sluggish and did not climb as he expected. The runway is surrounded on both sides by hills; however, the east side of the runway offers flatter terrain.

The aircraft had travelled approximately one mile prior to striking the hill, 250 feet above the airstrip elevation.

The aircraft was in a left bank attitude, with 15 to 18 degrees of left-wing-down at the time of initial tree contact. A detailed examination of the wreckage and powerplant did not reveal any pre-occurrence failure or malfunction. The aircraft speed in flight was 90 mph, and the aircraft turned left through approximately 150 degrees. The aircraft weighed 12,930 pounds at take-off, 142 pounds over the maximum weight authorized. The theoretical rate of climb for a 12,930-pound aircraft is 275 feet per minute.

No attempt was made to jettison the load prior to striking the hill.

ANALYSIS:

The climb capability of the overloaded aircraft was reduced during the turn to the extent that when the pilot initiated a left turn immediately after take-off, he placed the aircraft on a collision course with a small hill, and the aircraft was unable to clear the rising terrain.

FINDINGS:

Cause Related:

1. The pilot attempted to fly the aircraft in an overloaded condition.

2. The pilot initiated a continuous turn into higher terrain shortly after take-off, thereby reducing aircraft climb performance to the point that the aircraft could not clear the rising terrain.

Other:

- Nil -

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ZARN AIR SERVICES
CESSNA 188-230 C-GEBH
HIGH RIVER AIRPORT, ALBERTA
18 JUNE 1985

REPORT NUMBER: 85-W50029 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0835 MDT
OPERATION: Speciality Aerial Application and Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,569	280
LAST 90 DAYS	34	34

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot landed at the High River Airport after completing a spray run. As the aircraft slowed on the landing roll, the tail began to drop, and the pilot applied the brakes. The left brake functioned, but the right brake failed, and the aircraft veered to the left. The pilot applied right rudder and full power to correct but was unable to prevent the aircraft from leaving the runway. The right wheel collapsed, and the aircraft dropped onto its right wing before coming to a stop.

The investigation revealed that when the pilot applied brake during the landing roll, the right brake failed, and the pilot was unable to maintain directional control. The cause of the failures could not be determined.

FINDINGS:

Cause Related:

1. The right brake failed for undetermined reasons during the landing roll, and the pilot was unable to maintain directional control.
2. The right wheel collapsed for undetermined reasons.

Other:

- Nil -

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RISK OF COLLISION BETWEEN: AIR CANADA
FLIGHT 132 BOEING 767 and SKYCRAFT
FLIGHT 501 PIPER PA-23-250 AZTEC C-GMTY
TORONTO, ONTARIO 5 mi SW
08 JULY 1985
LOCAL TIME: 1800 EDT
INFORMATION SOURCE: Field Investigation

BOEING 767

REPORT NUMBER: 85-O/54183 (Incident)
OPERATOR: Air Canada
OPERATION: Scheduled Domestic
DAMAGE: Nil
PILOT LICENCE: Airline Transport

	PILOT-IN-COMMAND		FIRST OFFICER	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

PIPER PA-23-250 AZTEC C-GMTY

REPORT NUMBER: 85-O/54183 (Incident)
OPERATOR: Skycraft Air Transport Ltd.
OPERATION: Charter
DAMAGE: Nil
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	N/A

HISTORY OF THE FLIGHT:

Skycraft 501 was on a commercial flight from Windsor, Ontario to Oshawa. After passing the Ash very high frequency omnidirectional range (VOR), it was cleared by Toronto departure control to proceed at 7,000 feet direct to Oshawa, which corresponds to a track of about 065 degrees magnetic. Shortly thereafter, Air Canada (AC) Flight 132 contacted Toronto departure control after taking off from runway 24 Right at Toronto/Lester B. Pearson International Airport for Ottawa. On initial con-

tact, it had been cleared to turn left on a heading of 140 degrees magnetic. It was cleared about one minute after initial contact to continue the left turn to 080 degrees magnetic and to climb to flight level (FL) 230 (23,000 feet).

Twenty seconds after AC 132 was cleared to climb to FL 230, Skycraft 501 was cleared to descend to and maintain 4,000 feet. Forty-five seconds later, AC 132 was requested by the departure controller to tighten up the left turn and was advised of the conflicting traffic off the right side, two and one-half miles away. Twelve seconds later, Skycraft 501 was instructed to turn right to a heading of 120 degrees magnetic. Seconds later, the pilot of Skycraft 501 saw the Air Canada aircraft pass above and in front of his aircraft. He estimated the distance to be about 700 feet ahead and 300 feet above.

Both aircraft were clear of cloud and in visual meteorological conditions. The Air Canada crew had sighted Skycraft 501; the pilot of Skycraft 501 did not see the Air Canada aircraft until it passed close by.

PERTINENT INFORMATION:

The radar system which covers the Toronto area has the Mode C capability which allows the controller to have an altitude readout of the aircraft on his screen. However, only those airborne transponders with Mode C capability transmit the altitude of the aircraft. Skycraft 501's transponder had no altitude reporting capability nor was it required when operating in Toronto's airspace. The Toronto departure controller, who was handling both aircraft, did not ask the pilot of Skycraft 501 what his passing altitude was as the aircraft was descending to 4,000 feet.

ANALYSIS:

The conflict between the two aircraft began when AC 132 was cleared to turn further left to 080 degree during the climb and Skycraft 501 was cleared to descend from 7,000 to 4,000 feet. Each aircraft would have then been passing through the other's altitude. Since Skycraft 501's transponder was not providing altitude readout, the departure controller would have only known 501's altitude by requesting it over the radio. This was not done during 501's descent to 4,000 feet. When AC 132 was not turning within the expected distance, the controller requested AC 132 to tighten up the turn. Realizing that the aircraft were converging and not knowing Skycraft 501's altitude, the controller then requested 501 to alter heading to the right. This instruction was too late to provide proper separation. Since the controller did not know Skycraft 501's exact altitude, he

should have provided altitude restrictions or greater lateral separation.

FINDINGS:

Cause Related:

1. The departure controller did not determine the altitude of Skycraft 501 when the aircraft were on converging flight paths.

2. The departure controller did not ensure adequate vertical or lateral separation.

Other:

1. The Aztec Skycraft 501 was not equipped with an altitude encoding transponder.

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CESSNA 177 CARDINAL C-FWOE
CAPLAN, QUEBEC
15 JULY 1985

BRIEF NUMBER: 85-Q50033 (Accident)

LOCAL TIME: 2000 EDT

OPERATION: Private Recreational

DAMAGE: Substantial

PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	138	5
LAST 90 DAYS	6	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot and his passenger took off from Lachute, Quebec on a visual flight rules (VFR) flight to Saint-Siméon de Bonaventure, Quebec, a destination of 400 nautical miles. After 4 hours and 50 minutes of flight, about 2 miles from destination, the engine lost complete power, and the pilot landed the aircraft on a highway. During the landing, the right wing struck a sign, and the aircraft turned 180 degrees to the right before coming to rest in a ditch.

A few days before the scheduled departure, after he had studied the aircraft's operating manual, the pilot carried out a familiarization flight on the aircraft. Before his departure, the pilot filed a flight plan indicating his route non-stop to destination, flying at an altitude of 2,500 feet. The flight had been planned in accordance

with the aircraft's operating manual. At the planned cruising altitude and with the tanks completely filled, the aircraft had an endurance of 6.6 hours on 65 per cent power using a lean mixture.

During the flight, the pilot did not weaken the mixture for fear of raising the engine temperature. The engine stopped because of fuel exhaustion.

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KENTING EARTH SCIENCES LIMITED
PIPER PA31 NAVAJO C-GNID
TABLE MOUNTAIN, NEWFOUNDLAND
21 JULY 1985

REPORT NUMBER: 85-A50020

	CAPTAIN		FIRST OFFICER	
PILOT HOURS:	ALL	ON	ALL	ON
	TYPES	TYPE	TYPES	TYPE
TOTAL	20	000+	Unknown	9500 Unknown
LAST 90 DAYS	Unknown	47	Unknown	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	3	-	-
PASSENGERS	-	-	-

HISTORY OF FLIGHT

The operation was a planned magnetometer flight. The survey was to cover a block of airspace that was located on the south coast of Newfoundland. The block was to be flown on east/west tracks 1000 meters apart. The majority of tracks were to be flown over water. Some of the most northerly tracks would be over land. The aircraft departed Sydney, Nova Scotia at 0848 Newfoundland daylight time for the block. The aircraft advised Sydney Control Tower it would be surveying Block Two and beginning with the line lat.4741'5"N long.6004'00"W (the north line of the block), starting approximately 28 Nautical Miles (NM) west of Cape Ray over water; overflying the shore line about 3.5 NM north of Cape Ray; proceeding overland, eastbound towards Burgeo and Baie D'Espoir. The survey required 1000' clearance above terrain and/or the water surface. Smoke was spotted near the top of Table Mountain by some residents of Channel-Port Aux Basques around 1100. It was reported to the RCMP and they investigated. They found the aircraft had hit the side of Table Mountain (Elevation 1459 feet above sea level) at the 1000 foot level.

The accident occurred at lat 47°41' N, long 59°11' W, 10 NM north of Port Aux Basques, Newfoundland at 0950, during daylight hours.

CONCLUSIONS

CAUSE RELATED FINDINGS

1. The aircraft struck a mountainside at 1000 feet above sea level in level flight.
2. The aircraft approached land from over water at 1000 feet above sea level.
3. The weather was foggy and the high land was obscured from the crew's vision.
4. The crew was navigating by Loran "C". They were aware of the route programmed, but thought it to be another route which was entirely over water.

OTHER FINDINGS

1. The captain briefed another survey crew of his intentions while the co-pilot programmed the Loran "C" without benefit of the briefing.

SAFETY ACTION

An SDMS has been submitted requesting an article in the Safety Bulletin. The article should deal with the importance of including all crew in any operational briefings.

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CESSNA A185F C-FEKL
LAC SEPT-ÎLES, QUÉBEC
16 AUGUST 1985

REPORT NUMBER: 85-Q50046 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 2005 EDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,500	900
LAST 90 DAYS	200	200

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The float-equipped aircraft was landed into wind. As it was slowing down through about 40 mph, and while

Aviation Occurrence Reports

still on the step, the aircraft rolled to the left, and the left wing struck the water. The aircraft rolled upright again and was taxied to a marina. The left wing was damaged.

The pilot stated that the wind was from the northwest at about 15 mph and that a gust of wind lifted the right wing, causing the left wing to hit the water.

FINDINGS:

Cause Related:

1. The left wing struck the water during the landing roll, when the aircraft encountered a wind gust.

Other:

- Nil -

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ARROSAGE AÉRIEN DU SAGUENAY-LAC
SAINT-JEAN LTÉE
GRUMMAN G164B-450 C-GBOO
PÉRIBONKA, QUEBEC
21 AUGUST 1985

BRIEF NUMBER: 85-Q50047 (Accident)

LOCAL TIME: 1715 EDT

OPERATION: Specialty Aerial Application and Distribution

DAMAGE: Heavy

PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,000	1,000
LAST 90 DAYS	175	175

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was landing the biplane on a temporary runway bordered on either side by buckwheat. The wind was from the right at about 10 miles per hour. During the approach, while the aircraft was about five feet above the ground, the pilot lowered the right wings, the standard procedure for a cross-wind landing, and the right wings struck the buckwheat. The aircraft turned to the right and came to a stop on its nose.

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EXPRESSAIR R.L. INC.

CESSNA R182 C-GVCU

MANIWAKI AIRPORT, QUEBEC

02 SEPTEMBER 1985

REPORT NUMBER: 85-Q50052 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1620 EDT

OPERATION: Specialty Aerial Inspection Reconnaissance and Advertising

DAMAGE: Substantial

PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	701	460
LAST 90 DAYS	220	217

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

Returning from a fire patrol, the pilot, who was alone on board, wanted to make a short landing on runway 03 at Maniwaki Airport. The aircraft was on final approach at a speed of between 65 and 70 knots, with full flaps, the landing gear down, and the engine at idle, when the aircraft's rate of descent increased. The pilot quickly applied full power, and the engine misfired, then stopped. The pilot pulled back on the control column; the rate of descent increased further, and the aircraft touched down about 200 feet before the runway threshold. The main landing gear struts broke on impact. The aircraft slid on its belly and came to a stop about 130 feet before the runway threshold.

The weather conditions reported by an observer at the airport were clear sky, temperature 20 degrees Celsius, and winds north, northwesterly at 11 to 19 knots.

No pre-accident technical malfunction of the engine (Avco Lycoming 540-J3C5D) was detected. This engine may, however, misfire or stall if the increase in power is sudden instead of gradual.

The normal decrease in the wind speed as the height above ground decreased caused a drop in the aircraft's indicated airspeed and, consequently, a decrease in lift. The aircraft sank, and the pilot realized that he would not reach the runway. When the pilot increased power suddenly, the engine stalled. Instinctively pulling back the control column, the pilot caused another marked increase in the rate of descent of the aircraft, which hit the ground hard before the runway threshold.

FINDINGS:

Cause Related:

1. In order to counteract a high rate of descent and to lengthen his approach, the pilot increased power too suddenly, and the engine stalled.
2. By pulling back the control column, the pilot caused the rate of descent to increase and the aircraft hit the ground hard before the runway threshold.

Other:

- Nil -

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CHARLOTTETOWN FLYING SERVICES (1981)
LIMITED

CESSNA 172K C-FTYS

MILL RIVER, PRINCE EDWARD ISLAND

7 SEPTEMBER 1985

REPORT NUMBER: 85-A50023 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1245 ADT

OPERATION: Specialty Recreational Flying

DAMAGE: Substantial

PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	400	200
LAST 90 DAYS	20	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

In preparation for the return flight to Charlottetown, Prince Edward Island, the pilot, with two passengers on board, taxied to the end of the dry, grass airstrip. He set the brakes, applied take-off power, and then released the brakes to commence the take-off roll. The aircraft was not airborne at the 1,300-foot mark, and, in order to avoid obstacles at the end of the runway, the pilot rejected the take-off. He closed the throttle and applied the brakes, and the aircraft slipped and skidded on the grassy surface. The pilot steered off the right side of the runway toward a gate leading to a highway. The right wing struck trees beside the gate, and the aircraft swung around. The landing gear struck the edge of the highway, and the aircraft nosed down on the left wing and nose.

The private airstrip, which is 2,300 feet long by 50 feet wide, is situated in a cleared area of a large hay field. The surface of the runway was hard and rough and was covered by dry grass and hay stubble four to eight inches high. The first 1,200 feet of runway has a marked upslope in the take-off direction, and there are trees, wires, a highway, and a ditch at the end of the runway.

The temperature was 22 degrees Celsius, and the wind was from the southwest at 10 knots. The pilot did not compute how much runway he would require to take off successfully. The tires on the aircraft were badly worn, and there was little or no tread remaining.

Although the aircraft pilot operating manual states, "normal or obstacle clearance take-offs are performed with flap up", it also says that 10 degrees of flap are used for rough, soft or short-field take-offs. The pilot did not feel that a short or rough-field technique was required, so he did not use flap. The rough upsloping runway and warm temperature conditions, which affected the aircraft's take-off performance and caused the take-off roll to be extended, were also not considered by the pilot prior to take-off. Had all the information available to the pilot been used to determine the take-off distance required, he may have realized that, without the use of 10 degrees of flap, it would have been difficult to take off with adequate obstacle clearance.

The grassy runway surface combined with the badly worn tire tread, prevented the pilot from successfully braking the aircraft.

FINDINGS:

Cause Related:

1. The pilot did not calculate aircraft take-off performance with respect to runway conditions and ambient temperature.
2. The pilot did not use 10 degrees of flap as recommended in the operating manual.
3. The grassy runway surface and tire tread condition did not allow the aircraft to be braked to a stop on the remaining runway surface.

Other:

-Nil-

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Aviation Occurrence Reports

ALBERTA CENTRAL AIRWAYS LTD.
CESSNA A185F SKYWAGON C-GVUW
JANVIER AIRPORT, ALBERTA
09 SEPTEMBER 1985

REPORT NUMBER: 85-W50048 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1345 MDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,336	172
LAST 90 DAYS	351	57

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft landed at Janvier, Alberta on the 4,500-foot smooth gravel runway after a 45-minute flight from Lac La Biche. The aircraft was landed on the main wheels, and, to enhance forward visibility, the pilot kept the tail up by taxiing with power and brakes applied. As the aircraft slowed, it started to nose over; the pilot, at this time, applied full aft elevator control and continued to apply the brakes. The aircraft came to rest in an inverted position.

The weather was good with clear skies, visibility 50 miles, and temperature 15 degrees Celsius; the wind was calm to the southeast at 5 to 10 knots. There were no pre-occurrence aircraft malfunctions or failures. The Cessna A185F Pilot's Operating Handbook states that the aircraft should normally be landed in a three-point attitude; however, wheel landings are permitted.

In order to taxi with the tail up, the aircraft was balanced by elevator control input against engine thrust and wheel braking. However, as the aircraft speed decreased, the effectiveness of the elevator also decreased until the combined effect of the thrust and braking overcame the effort of the fully deflected up elevator, and the aircraft nosed over. The slight tail wind aggravated the situation. Reducing power and releasing the brakes may have prevented the aircraft's nosing over.

FINDINGS:

Cause Related:

1. While taxiing, the pilot kept the tail up to the point where he lost control of the aircraft, and it nosed over.

Other:
-Nil-

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GRACE FIELD AVIATION
CESSNA A180D C-FUWN
MARGARET LAKE, NEWFOUNDLAND
21 SEPTEMBER 1985

REPORT NUMBER: 85-A50028 (Accident)
INFORMATION SOURCE: Correspondence Investigation
TIME: 1720 NDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1100	600
LAST 90 DAYS	60	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The float-equipped aircraft was ferrying hunters and supplies to Margaret Lake. The pilot had disembarked his passengers and was taxiing for take-off when a gust of wind caught the left wing. The aircraft tipped over, and the right wing tip touched the water. As the aircraft was starting to settle back onto its floats, a second gust of wind caught the left wing, flipping the aircraft over onto its back. The aircraft was destroyed when it washed ashore over the rocks.

The winds in the area were approximately 20 to 25 knots with peak gusts of approximately 37 knots, causing swells on the lake. The very strong, gusty surface winds in conjunction with the rough water flipped the aircraft over before the pilot could react. Examination of the aircraft flight manual revealed no wind/cross-wind limitations for taxiing on wheels or on floats; however, the AIP suggests that take-offs not be attempted with a cross-wind component over 11 knots for this type of aircraft.

FINDINGS:

Cause Related:

1. A strong gust of wind caused the aircraft to flip over onto its back.

Other:

-Nil-

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NORTH CARIBOU FLYING SERVICE LTD.
CESSNA U206G C-GGMI
PINK MOUNTAIN, BRITISH COLUMBIA 58 mi NW
28 SEPTEMBER 1985

REPORT NUMBER: 85-W50052 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 PDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,200	210
LAST 90 DAYS	250	190

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft was on a charter flight to resupply an outfitter's lodge. The pilot had mistakenly landed at another airstrip in the same area as the intended destination. He off-loaded part of the cargo before attempting a take-off; the aircraft became airborne, but would not climb. It struck a dirt bank about 200 feet beyond the end of the airstrip, in a nose-high attitude and slid to a stop.

PERTINENT INFORMATION:

The pilot was not familiar with the area, and he checked the company files for the location of his destination. When he overflew the airstrip, he believed it to be the correct airstrip; so he completed an approach. After the aircraft had landed, the owner of the airstrip advised the pilot that he was at the wrong airstrip.

The pilot was concerned about the length and condition of the airstrip for a take-off. He paced it out and found it to be approximately 1,000 feet long by 15 feet wide, and, although fairly level, there were soft and undulating areas. The elevation of the airstrip is approximately 3,400 feet above sea level (asl), and the terrain to the east, in the direction of take-off, had several four-foot-high dirt banks, about 200 feet beyond the end of the runway. The pilot was concerned about the short runway

available and unloaded part of the cargo. No take-off performance calculation was made.

ANALYSIS:

At the time of take-off, the wind direction and speed were not precisely known. It is possible that the pilot experienced a slight tail wind on lift-off. The pilot used all available runway length for take-off, and the correct short-field technique was applied.

The pilot believed he could find and identify the outfitter's airstrip; however, he had not marked the location of the airstrip on his map and, as a result, landed at the wrong airstrip. The pilot realized from experience that he would have difficulty taking off with full cargo from the short airstrip; however, he did not carry out a detailed performance calculation to consider the effect of runway length, surface condition, and possible adverse wind. The amount of cargo off-loaded was insufficient to compensate for the limited take-off distance available.

FINDINGS:**Cause Related:**

1. The pilot misidentified and landed at an airstrip which was too short for a take-off at the aircraft's existing weight.
2. The pilot did not compute the aircraft's take-off performance; consequently, he attempted the take-off at too high a weight for the take-off distance available.

Other:

- Nil -

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Aviation Occurrence Reports

NORTHWEST TERRITORIAL AIRWAYS LTD.
LOCKHEED 188C C-FIJR
FORT FRANCES, ONTARIO 36 mi E
23 SEPTEMBER 1985

REPORT NUMBER: 85-C50083 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0245 CDT
OPERATION: Scheduled Domestic
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

	CAPTAIN		FIRST OFFICER	
PILOT HOURS:	ALL	ON	ALL	ON
	TYPES	TYPE	TYPES	TYPE
TOTAL	10,000	1,800	15,000	N/A
LAST 90 DAYS	250	250	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

Flight 802 was proceeding on an instrument flight rules (IFR) flight from Toronto to Winnipeg. About 36 miles east of Fort Frances, Ontario, while in cruise at flight level 200, the crew heard a loud "bang"; the number one engine fire warning light illuminated, and the fire bell sounded. Simultaneously, the aircraft yawed and rolled to the left. The fire bell was silenced, and, when the Emergency Shutdown handle was pulled, the fire warning light went out. A loss of power was then observed on the number two engine and sparks were seen coming from the front of the nacelle. The number two engine Emergency Shutdown handle could not be pulled, and engine stoppage was accomplished by shutting off the fuel.

The aircraft diverted to, and landed safely at Thunder Bay, using normal two-engine landing procedures.

PERTINENT INFORMATION:

After the aircraft was taxied to the ramp, the crew discovered that major portions of the gearboxes and propeller shafts and the propellers were missing from both the number one and the number two engines. Flying debris had caused considerable damage to the fuselage and dorsal fin; nacelle damage was also evident. Despite the damage that occurred to the aircraft in flight, there was no explosive decompression.

Examination of the aircraft's log books did not reveal any problems relative to this occurrence. All prescribed maintenance had been completed, and there were no

serviceability deficiencies reported prior to the flight. The times since overhaul on engine number 1 and number 2 are as follows:

	Number 1 (hours)	Number 2 (hours)
Engine	7,793	9,748
Gearbox	793	7,000
Propeller	1,842	2,257

The aircraft was operating below its allowable gross weight, and the centre of gravity was within limits.

At the time of the occurrence, the pilot reported that the aircraft was above the cloud layer and in smooth air conditions. Visual flight rule conditions existed at Thunder Bay, and the decision was made to land at Thunder Bay.

An ICAO computer search revealed that this occurrence was the third such occurrence on file since 1970. The other two occurred on 23 February 1982 in Norway and on 08 January 1983 in Alaska. The cause of the propeller separation was not determined.

In an attempt to locate the missing parts, aerial photographs were taken of the area where the propellers and other components separated from the aircraft. Although several promising targets were pinpointed, a target location search by a helicopter crew proved to be fruitless, and none of the component parts was located.

Field and laboratory investigation revealed that the number one engine turbine section turned freely, whereas the number two turbine section was seized.

The following laboratory reports have been completed: LP 120/86- Recovery of Propellers/Gearbox; and LP 228/85 - Reduction Gear Cases.

ANALYSIS:

As both propeller assemblies failed almost simultaneously, it is assumed that the failure of one assembly caused the failure of the other through damage caused by flying debris.

The number two engine was damaged internally, most likely when parts of the failed gearbox were ingested. Damage to the engine resulted in the number two Emergency Shutdown handle being inoperative.

The recovery of the missing component parts is essential in determining the cause of failure.

FINDINGS:**Cause Related:**

1. The numbers one and two gearboxes and propellers separated from the aircraft for undetermined reasons.

Other:

-Nil-

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GRANDE PRAIRIE AIR SERVICE LTD.

CESSNA 206 C-FILO

GRANDE PRAIRIE, ALBERTA 9 mi S

20 NOVEMBER 1985

REPORT NUMBER: 85-W50065 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 0135 MST

OPERATION: Commercial

DAMAGE: Substantial

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,000	75
LAST 90 DAYS	150	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot departed Calgary for the return flight to Grande Prairie, Alberta on a night visual flight rules (VFR) flight plan. As the aircraft was on approach and descending through 1,500 feet above ground level (agl) the engine lost power. The pilot attempted to restore power but was unsuccessful. The pilot observed vehicle headlights on a steep gravel road leading from a river valley, and he carried out a forced landing on this road. On short final, the pilot sighted a power line strung across the road and dove under it to avoid a collision. The aircraft landed hard, damaging the nose wheel, propeller and fuselage.

When the aircraft was examined, fuel stains were found on the upper surface of the right wing, downstream from the fuel filler opening. The right fuel filler cap O-ring seal had deteriorated, and ice particles were found on the seal surface. The lower surface of the right fuel tank bladder had lifted up and was visible at the inside edge of the fuel filler opening. The right fuel quantity gauge float had been lifted by the movement of the fuel bladder.

The fuel stains indicate that fuel had siphoned from the tank in flight. Ice particles found on the filler cap O-ring seal prevented the cap from sealing and allowed fuel to be drawn from the tank while the aircraft was in flight. The O-ring surface contained checks or vertical cracks, typical of an age-deteriorated rubber product, which detracted from the O-ring's flexibility and sealing qualities. The leaking fuel filler cap also exposed the interior of the fuel tank bladder to the low pressure area normally present on the upper surface of the wing in flight. The effect of this exposure was to draw the bladder up toward the filler opening. When the lower surface of the bladder lifted, it raised the fuel quantity float, resulting in a false fuel gauge indication.

The flight to Calgary began at 1815 MST; however, the pilot had been at the airport and worked at the hangar all day. This resulted in an 18-hour work period prior to the accident and may have led to less than optimum performance.

FINDINGS:**Cause Related:**

1. The right-hand fuel filler cap O-ring was deteriorated and was contaminated with ice particles, thus allowing the fuel to siphon from the tank.

2. The siphoning action raised the floor of the right-hand fuel tank bladder, which, in turn, lifted the fuel quantity gauge float, thus producing a false fuel gauge indication.

3. The engine lost power because of fuel starvation as a result of fuel siphoning from the right fuel tank.

4. The pilot was unsuccessful in his attempt to restart the engine.

Other:

1. The pilot completed an 18-hour work period prior to the accident.

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Aviation Occurrence Reports

PIPER PA28-R-180 C-FWQJ
CALGARY INTERNATIONAL AIRPORT, ALBERTA
3 JANUARY 1984

REPORT NUMBER: 84-W40002
INFORMATION SOURCE: Correspondance Investigation
LOCAL TIME: 1800 MST
OPERATION: Private training
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	125	1
LAST 90 DAYS	4	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

During the fourth circuit, in darkness, the aircraft landed hard and bounced. On the attempted go-around it swerved off the runway and the left wing was severely damaged after hitting an illuminated sign.

The new owner was in the left pilot's seat and a salesman, who held a private pilot's licence, was in the right seat. The owner's son was in the rear.

The new owner stated that he invited the salesman/pilot along to check him out on the aircraft type. The salesman insisted that he went along for the ride and had no responsibilities. He gave conflicting statements about whether he touched the controls during the flight.

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CESSNA 180A CF-JEW
YELLOWKNIFE AIRPORT, YUKON 4 mi E
01 FEBRUARY 1984

REPORT NUMBER: 84-W40005
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1340 MST
OPERATION: Private testing
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	540	20
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	2	-	-

SUMMARY REPORT:

The pilot having agreed to purchase the aircraft, took off from Yellowknife Airport to conduct a maintenance test flight to renew the aircraft's Certificate of Airworthiness. The right front seat passenger, a private pilot, was to be a partner in the purchase. The other passenger sat in the rear although the seat had been previously removed.

After flying two circuits, the pilot requested a left turn out to Fort Providence, 115 miles away. Thirty-four minutes later he transmitted he was 20 miles out, inbound for a landing at Yellowknife. After landing, he taxied back to the button of the runway for another take-off; however, he requested a delay because his windshield was ice-covered. Eleven minutes later he took off again, flew a circuit and requested permission to fly over the East Bay. Over the bay, the aircraft was seen flying low at high speed, then climb abruptly to a height of 200 to 300 feet above the ice where it stalled. The aircraft struck the ice in a steep nose-down right wing low attitude and cartwheeled several times.

The pilot likely encountered icing conditions enroute to Port Providence and returned to Yellowknife. Although no ice was found on the airframe wreckage, it is probable there was some ice on the flight surfaces. This would affect the aircraft's performance, increasing the stall speed.

The pilot was qualified and had 20 hours experience on the Cessna 180, but had last flown this type in August 1981. His last known flight was about 6 months previously. In addition, his blood alcohol level of 110 mg/100 ml was enough to appreciably degrade mental and physical capabilities.

The partially inebriated pilot stalled the aircraft while flying an abrupt manoeuvre at low altitude. Contributing factors may have been his lack of currency and proficiency and degraded aircraft performance due to airframe icing.

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PIPER PA-24-250 COMANCHE C-FNQL
MONTREAL-DORVAL INTERNATIONAL
AIRPORT, QUEBEC
04 FEBRUARY 1984

REPORT NUMBER: 84-Q40008 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1728 EST
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,150	180
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

After take-off from Montreal-Dorval International Airport for a local training flight, the pilot was cleared to practise instrument approaches. During his second approach, he selected the landing gear down, and the circuit-breaker popped. He then made several attempts to extend the gear, but the breaker popped each time. Attempts to lower the gear manually were unsuccessful, since the transmission could not be disengaged. The pilot requested and received clearance to make a wheels-up off-runway landing at Dorval.

On the following day, the aircraft was jacked up, and the gear-down sequence was repeated about a dozen times; electric power was provided by the battery alone. The power supply and landing gear circuit operated normally, and no malfunction was noted. It was not possible to determine why the landing gear circuit-breaker popped. However, it was impossible to extend the gear manually because the release arm connectors were bent outwards. This was the result of a similar accident which had occurred about two years earlier. The damaged part had not been replaced. If it had been changed, it would have been possible to extend the landing gear manually.

FINDINGS:

Cause Related:

1. The landing gear could not be extended by the normal or manual methods.
2. It was not possible to determine why the landing gear circuit-breaker popped whenever the pilot attempted to select the gear down.
3. It was impossible to extend the gear manually because the release arm connectors were bent outwards.
4. The rod was bent because of an identical accident which had occurred two years earlier; the damaged part had not been replaced.

Other:

-Nil-

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MOONEY M20B CF-ZOY
HERBERT CORNERS, ONTARIO 1 mi E
25 FEBRUARY 1984

REPORT NUMBER: 84-Q40004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1833 EST
OPERATION: Private Company Business
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	348	162
LAST 90 DAYS	8	8

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

When the aircraft arrived at its destination (Ottawa Airport), the weather was below visual landing limits. The pilot declared an emergency and requested a clearance for an instrument flight rules (IFR) approach. While being vectored for the approach, the aircraft disappeared from radar. A search aircraft found the wreckage six miles southeast of the airport.

Aviation Occurrence Reports

PERTINENT INFORMATION:

The investigation showed that the aircraft struck the ground at high speed in a nose-down, right-wing-low attitude.

The weather briefing presented to the pilot, prior to his departure from the Toronto Island Airport, indicated that the destination weather would be marginal. When initial radio contact was established with Ottawa terminal control, the aircraft was already in cloud and snow at 5,500 feet above sea level. The controllers were not immediately made aware that the pilot was flying in instrument conditions. Although the aircraft was IFR equipped, the pilot was not instrument rated. He did have a night endorsement; however, he had little instrument experience other than that required for his night endorsement.

ANALYSIS:

Air Traffic Services (ATS) personnel questioned the pilot's IFR qualifications when he requested an approach and suggested that he head for the Rockcliffe or Carp Airport where a visual flight rules (VFR) approach might be made. The pilot did not accept the advice; instead, he declared the emergency and requested clearance for a descent. ATS personnel complied with the request and vectored him for an approach to the Ottawa airport.

While being vectored, control of the aircraft was lost. Physical evidence at the crash site indicated that the aircraft descended in a spiral dive.

FINDINGS:

Cause Related:

1. The pilot flew under VFR into marginal weather conditions.
2. Before vectoring the aircraft for a descent to the Ottawa airport, ATS personnel suggested that the pilot head for an airport where a VFR approach might be made; this advice was not accepted.
3. An emergency was declared and a descent to Ottawa airport was requested.
4. The pilot continued his flight into weather conditions requiring procedures for which he was not qualified.
5. The aircraft struck the ground while descending in a steep spiral turn.

Other:

- Nil -

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CESSNA 172N C-GQVX
CHARLEVOIX AIRPORT, QUÉBEC
11 APRIL 1984

REPORT NUMBER: 84-Q40014 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1600 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	132	132
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft was on approach in a gusty cross-wind from the right. At about 150 feet above ground, the aircraft started to drift to the left. The aircraft continued to drift left as the pilot descended. As the aircraft neared the left side of the runway, the pilot applied full power and lowered the nose to overshoot. The aircraft yawed to the left, and the left wing hit a tree outside of the runway; the aircraft spun around and struck the ground.

The investigation established that the maximum cross-wind component at the time of the occurrence was 19 knots. The maximum demonstrated cross-wind component for this aircraft is 15 knots. Soon after the accident, an instructor took the pilot up for an evaluation ride in another aircraft in the same wind conditions. The instructor later commented that, during the first landing, the pilot was confused with respect to the combined use of rudder and aileron controls and that he had to take over control of the aircraft.

The pilot allowed the aircraft to drift at a low height in the cross-wind to a position near the left edge of the runway. The fact that he had to lower the nose of the aircraft to overshoot indicates that he had also allowed the speed to decay. When he attempted to overshoot, the combined effects of the cross-wind and the yaw created by the propeller slip-stream caused the aircraft to yaw to the left. The difficulties which the instructor observed during the subsequent ride indicated that the pilot was

not fully capable of handling the aircraft in these wind conditions.

FINDINGS:

Cause Related:

1. The pilot elected to land the aircraft in wind conditions which exceeded the maximum demonstrated cross-wind limit for the aircraft and which exceeded the pilot's capabilities.

2. The pilot did not adequately correct for the cross-wind on approach, and he allowed the aircraft to drift to the left side of the runway.

3. During the overshoot, the pilot lost control of the aircraft.

Other:

- Nil -

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BEECHCRAFT BONANZA 35 C-GODJ
EDMONTON MUNICIPAL, ALBERTA
24 APRIL 1984

REPORT NUMBER: 84-W40026 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0620 MST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,306	1,500
LAST 90 DAYS	50	28

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft had climbed to about 200 feet, when the engine (Continental IO 470 N) lost partial power. With insufficient thrust available to maintain flight, the pilot selected the landing gear down and landed approximately halfway along the 5,700-foot runway, while the landing gear was still in transit. The aircraft slid to a stop 1,500 feet from the end of the runway.

An examination of the aircraft's fuel system revealed contaminants in the fuel tanks, fuel filter, and injection nozzles. No contaminants were found in the injection

screen or the distributor screen. The contaminants were a mixture of fine siliceous material, paint chips, and rust particles, which are normally removed from the system by the fuel strainers. In addition, there was a gelatinous substance present which was assessed as being either an adhesive or a sealant. It was not possible to determine the source of either the solid or gelatinous contaminant.

The engine was started, and it ran normally producing full power. On two occasions when the engine was at 2300 rpm, the engine speed dropped to 1500 rpm, and the engine ran rough for a period of about 30 seconds before resuming normal operation at 2300 rpm. During the periods of rough running, the magnetos were checked and found to be serviceable. It was concluded that the gelatinous substance could temporarily restrict fuel flow through the fuel nozzles and affect the power output of the engine.

FINDINGS:

Cause Related:

1. The engine lost partial power shortly after take-off because contaminants of unknown origin in the fuel system restricted the flow of fuel through the fuel nozzles.

2. The pilot selected the landing gear down and force-landed the aircraft on the remaining runway with the gear still in transit.

Other:

- Nil -

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Aviation Occurrence Reports

MAULE M-5-210C C-GEYS
HORSEFLY, BRITISH COLUMBIA 1 1/2 mi E
11 MAY 1984

REPORT NUMBER: 84-P40017 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0945 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	710	217
LAST 90 DAYS	30	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot had just completed several steep turns at low level over an open field, when the engine (Continental IO-360-D33A) began to run rough. He decided to carry out a precautionary landing rather than risk an engine power loss. Upon touchdown, the aircraft bounced into the air, and the pilot recovered by applying power. Rather than attempting an overshoot, the pilot made a turn to the right and carried out a landing on an adjoining field. During the roll-out, the aircraft struck a large rock, causing considerable damage to the fuselage, the left wing, and the main gear.

The cause of the rough running engine was not determined. During the precautionary landing, the pilot did not observe the rock in time to avoid it.

FINDINGS:

Cause Related:

1. The engine ran rough for undetermined reasons.
2. The precautionary approach resulted in a bounced landing.
3. During the second landing attempt, the pilot did not observe the large rock in the landing path in time to avoid it.

Other:

- Nil -

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GRUMMAN G164A C-GWND
WAINWRIGHT, ALBERTA 5 mi NE
13 JUNE 1984

BRIEF NUMBER: 84-W40034
LOCAL TIME: 0630 MDT
OPERATION: Private Spray
PILOT LICENCE: Commercial
DAMAGE: Minor

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2500	700
LAST 90 DAYS	40	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-
OTHER	-	1	-

REPORTED CIRCUMSTANCES:

During an aerial spray run the pilot suddenly noticed power lines obstructing his flight path. He judged that a pull-up would cause the aircraft to strike the wires and elected to fly under. As the aircraft passed under the wires the main gear contacted the edge of a rural road and the left wing and spray bar struck a flagman. The aircraft bounced into the air; the pilot maintained control and positioned himself for another spray run, unaware that he had hit the flagman. The pilot soon noticed the injured person and landed in a nearby field to render assistance. The pilot cited fatigue and glaring early morning sunlight as factors that contributed to the accident.

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CESSNA 182Q C-GGHY
LLOYDMINSTER, SASKATCHEWAN 9 mi NE
13 JUNE 1984

BRIEF NUMBER: 84-W40035
LOCAL TIME: 1200 MDT
OPERATION: Private Recreation
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	385	100	
LAST 90 DAYS	18	18	

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

REPORTED CIRCUMSTANCES:

While enroute the pilot decided to land on a grass strip to drop-off two passengers before proceeding to his destination. The pilot flew a straight-in approach. On touchdown the aircraft bounced and the pilot pushed forward on the control column to prevent ballooning. The aircraft struck the ground nose down breaking off the nose gear.

The pilot did not inspect the field before landing. The first several hundred feet of the landing strip were situated on rolling terrain. The initial touchdown was made onto rising terrain which contributed to the severity of the bounce.

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PIPER PA-28-161 CHEROKEE N3578D
HILL ISLAND LAKE, NORTHWEST TERRITORIES
03 JUNE 1984

REPORT NUMBER: 84-W40903 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1424 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (U.S.A.)

	PILOT-IN-COMMAND	CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES ON TYPE
TOTAL	480	380	235 200
LAST 90 DAYS	25	25	11 11

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The husband and wife, both pilots, were on a holiday flight to Alaska from the Eastern United States. They had stopped over at Montreal, Quebec and then proceeded to Churchill, Manitoba. After an overnight stay at Churchill, they departed the next morning for Uranium City, Saskatchewan on an instrument flight rules (IFR) flight plan. They lost contact with the Churchill VOR at about 150 miles west. Unable to pick up other navigation aids and unable to pinpoint themselves visually, they became lost. The pilots decided to make a precautionary landing before their fuel was exhausted. Spotting a large lake, they landed in a small clearing in the muskeg. At the time of their landing, they were in radio contact with a local pilot who recognized the lake from their description, and, after locating them, he dispatched a float plane to pick them up.

The flight planned altitude was at 8,000 feet. The cloud coverage was such that it prevented the pilots from maintaining visual contact with the ground. From the Saskatchewan-Manitoba border, they flew on top of cloud for 100 miles. The wind was forecast to be strong and from the south. A ten-degree drift correction had been applied, but this was insufficient, and the aircraft drifted north of track. The pilot's decision to carry out a precautionary landing after determining he was lost was in accordance with recommended procedures.

Their first leg was a direct flight from Churchill to Stony Rapids, Saskatchewan. Out of range of the Churchill VOR at 150 miles, they faced at least 100 miles without any navigation aids. The cloud together with the type of terrain below prevented the pilots from fixing

Aviation Occurrence Reports

their position visually. Had they flown a longer route via Lynn Lake they would have been in range of navigation aids throughout.

FINDINGS:

Cause Related:

1. The pilots elected to fly a direct route that had minimal navigation aids.
2. Out of range of navigation aids and unable to pinpoint their position visually, they became lost.
3. The aircraft was damaged when the pilots elected to make a precautionary landing in accordance with recommended procedures.

Other:

-Nil-

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CESSNA 182M C-GHJV
SALMO, BRITISH COLUMBIA 14 mi SE
29 JULY 1984

REPORT NUMBER: 84-P40039 (Accident)
INFORMATION SOURCE: Field LOCAL TIME: 1005 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,976	100
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot departed Swift Current, Saskatchewan on a visual flight rules (VFR) pleasure flight to Penticton, British Columbia. Just past (to the west of) the summit of the Salmo-Creston highway, while in level cruising flight, the aircraft struck trees and crashed. A post-impact fire destroyed the cabin section of the aircraft. The pilot died in the crash.

The pilot was probably following the highway which rises rapidly from Creston to the summit, 5,820 feet above sea level (asl), then descends to Salmo. The aircraft crashed 200 feet north of the highway at about 5,700 feet asl. There were no indications of pre-crash

aircraft failures or malfunctions. There was no emergency locator transmitter (ELT) aboard the aircraft.

The weather in the areas of Cranbrook, Sparwood, Revelstoke and Castlegar was basically as forecast, that is, ceilings were about 7,000 feet asl. However, a short time after the accident, a motorist who saw and reported the fire caused by the crash, stated that the crash area was "packed in with fog" with the visibility about 200 feet.

It is probable that the pilot encountered the fog just as he passed the summit, and, at this point, there was insufficient room in which to turn around. In trying to maintain or regain visual contact with the ground, the pilot inadvertently flew the aircraft into the trees.

FINDINGS:

Cause Related:

1. The pilot encountered fog during flight and crashed while attempting to maintain or regain visual contact with the ground.

Other:

1. The aircraft was not equipped with an ELT.

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GRUMMAN AMERICAN AA5A N26428
FORT WARE, BRITISH COLUMBIA 32 mi NE
08 AUGUST 1984

REPORT NUMBER: 84-P40903 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1830 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	150	-
LAST 90 DAYS	-	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The pilot, with one passenger on board, departed the Watson Lake Airport on a visual flight rules (VFR) flight via the Rocky Mountain Trench, to Prince George, British Columbia. Prior to departure, the pilot obtained a weather briefing from the flight service specialist (PSS)

at the airport which indicated VPR conditions with isolated-cumulonimbus (CB). En route, about an hour later, the pilot encountered heavy rain showers which reduced the visibility, so he turned back toward Watson Lake.

A short time later, the pilot established radio contact with two other southbound aircraft. After discussing the route and the weather, the pilot decided to resume the original flight in the company of the other two aircraft. Shortly after, as the aircraft approached a dark and rainy area along the Trench, the pilot turned to the left toward a brighter area hoping to circumnavigate the area of heavy rain. During the last radio contact with one of the other aircraft, the pilot indicated that he was totally lost. He then decided to carry out a forced landing in a brush-covered area.

Although the area selected for the landing was fairly open, the right wing struck a tree 20 feet above the ground and control of the aircraft was lost. The outboard five feet of the right wing, aileron, and flap were torn off. The aircraft rolled to the right, descended gradually, and contacted the ground with the left wing. The aircraft then cartwheeled, tearing off the tail section and everything forward of the front seat before coming to rest in an inverted position. The passenger, the only survivor, was seriously injured but managed to escape from the wreckage.

The area of CB's and heavy rain showers turned out to be more extensive than forecast. There is only one weather reporting station along the route, and the reports from that station are limited and not always reliable. The distance between Watson Lake and the first dependable reporting station along the route is 281 nautical miles. This extreme distance makes en route forecasting unreliable.

The pilot had initially made the right decision to return to Watson Lake. Once he left the Trench to circumnavigate rain showers, his problems increased. Had the pilot been more experienced, he might have been able to cope with the deteriorating conditions.

FINDINGS:

Cause Related:

1. The weather along the route was worse than what had been forecast.
2. The pilot continued into weather that exceeded his capabilities.
3. During the forced landing, the right wing struck a tree causing the pilot to lose control of the aircraft.

Other:
- Nil -

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PIPER PA-22-150 CF-JBO
PRESPATOU, BRITISH COLUMBIA
22 AUGUST 1984

REPORT NUMBER: 84-W40063 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1030 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	300	75
LAST 90 DAYS	75	75

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was taking off from a dirt road in the Prespatou area. After lift-off, he selected full flap to ensure that he would be well above a power line which crossed the road. The aircraft climbed steeply and then started to settle; the left wing dropped, and the aircraft struck the ground. A post-impact fire broke out, destroying the aircraft and seriously injuring the pilot.

The passenger was able to kick the door open and exit unassisted. The pilot was unable to free himself and was pulled free by a witness shortly before the aircraft was consumed by fire.

The road was dry, firm, and sloped uphill. A power line crossed the road 3,000 feet from the point where the take-off was initiated. The winds were calm.

The uphill slope resulted in a longer ground run. As the aircraft lifted off, the pilot selected full flap to increase his rate of climb. The selection of full flap did not allow the aircraft to maintain flying speed in a steep climb, and the aircraft stalled.

The pilot had flown only 300 hours in the past 10 years. He was given a check ride on the aircraft type a few months before the accident and was advised to obtain more dual instruction, but he did not heed the advice.

Aviation Occurrence Reports

FINDINGS:

Cause-Related:

1. The pilot attempted the take-off in an uphill direction when the opposite direction was more suitable.
2. The pilot incorrectly applied full flap at lift-off.
3. The aircraft stalled during the climb-out.

Other:

1. The pilot did not obtain additional dual instruction as advised.

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WREN 460J C-GSOZ
ST. ANDREWS, MANITOBA
28 AUGUST 1984

REPORT NUMBER: 84-C40075 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1230 CDT
OPERATION: Private Company Business
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,000	3
LAST 90 DAYS	Unknown	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

Following a stop-and-go landing on runway 22 at St. Andrews, the aircraft was observed to enter a steep left turn at low altitude. It briefly maintained an altitude of approximately 50 feet, turned through 100 degrees, and then descended and struck the ground with the left wing tip. The aircraft cartwheeled, came to rest in an inverted position, and caught fire. The seriously injured pilot escaped from the wreckage before it was consumed by fire.

The Wren 460J is a Cessna 182J highly modified to improve short take-off and landing (STOL) performance. The pilot's company had recently imported the aircraft; the pilot was conducting touch-and-go landings which were being recorded by video camera in order to produce a sales promotional tape. Investigation revealed that the pilot was legally qualified and fit for the flight. Although he had extensive light aircraft experience, he had received no formal check-out on the Wren and had

flown it for a total of three hours before the accident. In the take-off configuration, the main handling difference between the Wren and a conventional Cessna 182 is the flatter initial climb attitude.

Winds at the time of the crash were varying in direction from 210 to 290 degrees magnetic and gusting from 15 to 35 knots. The accident sequence began as a demonstration of short take-off performance from a stopped position. The pilot reported using normal cross-wind take-off techniques but immediately experienced uncommanded left yaw and roll which he could not overcome with the use of rudder or ailerons.

Investigators were unable to duplicate this phenomenon in a controlled test flight on another WREN; moreover, the technical investigation could find no defect in the flight control design or rigging that would account for the pilot's inability to control the aircraft. Although the accident sequence could not be determined with certainty, evidence indicates that the aircraft became airborne prematurely in the gusty cross-wind and that the marginal control situation was then aggravated as the aircraft turned out of wind.

The Wren was not fitted with a shoulder harness, and considering the severity of the crash, the pilot was fortunate to survive the impact.

FINDINGS:

Cause Related:

1. The STOL take-off was attempted in a variable gusty cross-wind.
2. The pilot had limited experience in the Wren and had received no formal check-out.

3. It is likely that the aircraft lifted off at marginal flying speed for the gusty wind conditions, and the pilot lost control.

Other:

1. The aircraft was not fitted with a shoulder harness and none were required by regulation.

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PIPER PA-24-180 COMANCHE C-GWSW
EDMONTON, ALBERTA
30 AUGUST 1984

REPORT NUMBER: 84-W44087 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1045 MDT
OPERATION: Private Recreational
DAMAGE: None
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,800	1,500
LAST 90 DAYS	150	130

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft was approaching the municipal airport for a landing, when the engine (Lycoming O-360 AID) lost power. Unable to glide to the runway, the pilot turned the aircraft to the right and force-landed on the empty parking lot at the exhibition grounds. The aircraft was not damaged. It was started up, taxied clear of the parking lot, and later trucked to the airport for examination.

The wing-tip fuel tanks were empty; however, there was adequate fuel remaining in the wing tanks to operate the engine. Technical examination of the fuel tank selectors showed that they were stiff to turn and that the position detents were not positive. The plug valves were grooved and lacked lubrication; however, the fuel selectors were serviceable and capable of normal operation.

Wing tip tanks had been installed on the aircraft under Supplemental Type Certificate (STC) No. SA4-1351. The flight manual supplement warns that "when any tank is run dry, position that fuel selector valve to OFF position or to a tank with fuel remaining. Do not leave tank selector on an empty tank". If the selector valve were left on an empty tank, air could enter the fuel system, create an airlock, and cause the engine to stop. The fuel selector valve position at the moment of the power loss was not determined; however, the engine did stop because of fuel starvation.

Because the detent position was not positive, it was difficult to make a fuel tank selection and be certain that it was positioned in the detent.

FINDINGS:

Cause Related:

1. The engine experienced fuel starvation for undetermined reasons.

Other:

1. The fuel selector valves were stiff to operate, and the position detents were not positive.

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CESSNA 150 CF-MKD
ASBESTOS, QUÉBEC
08 SEPTEMBER 1984

REPORT NUMBER: 84-Q40071 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	460	Unknown
LAST 90 DAYS	11	11

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

Shortly after taking off from a gravel strip, the pilot began a right turn. When the aircraft was at a height of about 300 feet above ground, the engine had a momentary loss of power followed by a surge. The aircraft then entered a steep left turn. While turning, it went abruptly into a nose-down attitude and started to rotate rapidly about its longitudinal axis. The aircraft kept going down while rotating until it struck the ground. A fire broke out consuming the cabin, and the pilot was fatally injured.

PERTINENT INFORMATION:

Before going to the airport, the pilot was informed that there was very little fuel in the aircraft and he brought approximately three gallons of fuel in cans. It could not be established how much fuel was left in the tanks and in which tank fuel was poured. In this type of aircraft, three gallons of fuel are unusable. Momentary fuel starvation would cause a temporary loss of power followed by a surge. The left fuel filler cap was not found in the wreckage.

Aviation Occurrence Reports

ANALYSIS:

The investigation could not establish the cause of the engine malfunction. When the engine sputtered, the pilot entered a steep left turn in order to return to the airport. While in the turn, the aircraft stalled and went into a spin. The pilot could not effect a recovery before the aircraft reached the ground.

FINDINGS:

Cause Related:

1. While the aircraft was climbing, the engine malfunctioned for undetermined reasons.
2. Because of the engine malfunction, the pilot attempted to return to the airport by performing a steep left turn; while in the turn, the aircraft stalled and went into a spin from which a recovery could not be effected.

Other:

1. The left fuel filler cap was not found in the wreckage.

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HUDSON'S BAY COMPANY
DHC-6-300 C-CNSD
SUGLUK, QUÉBEC
18 SEPT 1984

REPORT NUMBER: 84-Q40075 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1730 EDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	6500	2000	
LAST 90 DAYS	42	12	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	-
PASSENGERS	-	-	4

SUMMARY REPORT:

It appeared to the pilot that the winds were calm as he flew over the village. Without confirming that the same wind condition applied at the airstrip nearby, he decided to land on runway 31, as its upsloping grade would allow him to slow down more rapidly on the landing roll. Shortly after touchdown, directional control of the aircraft was lost and it veered off the runway into a ditch.

It was later determined that the winds were not calm and that the aircraft had landed downwind in a strong, gusting, left-quartering wind. During the landing roll, as the aircraft slowed down, it began to weathercock into the cross-wind. The pilot's flight control inputs were ineffective in keeping the aircraft on the runway.

FINDINGS:

Cause Related

1. A no-wind condition had been anticipated on landing.
2. The aircraft was landed downwind in a cross-wind.
3. Flight control inputs were ineffective in maintaining directional control of the aircraft.
4. The aircraft hit a ditch when it veered off the runway.

Other

- Nil -

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PIPER PA-18-150 AZTEC C-GQYD
MANNING, ALBERTA
21 SEPTEMBER 1984

REPORT NUMBER: 84-W40067 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0955 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,600	10
LAST 90 DAYS	30	9

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

While the aircraft was cruising at low level on a visual flight rules (VFR) flight, the engine began to run rough. The pilot corrected the problem by leaning the fuel mixture. However, after a few minutes, the engine again ran rough and further leaning was required. Each time the mixture was leaned, the engine developed less power until flight could no longer be maintained, and the pilot stalled the aircraft into a swamp. The passenger was uninjured; however, the pilot sustained minor head in-

juries. The pilot was not wearing the installed shoulder harness.

At the time of the accident, the cloud base was about 500 feet above ground, the visibility was more than 15 miles, and the temperature and dew point were about three degrees and one degree Celsius respectively. The pilot was flying the aircraft just below the cloud. These conditions are conducive to the formation of serious carburettor ice at any power setting (Aeronautical Information Publication (AIP) Canada, Air paragraph 2.6).

The engine lost power because of the formation of carburettor ice. As carburettor ice forms, the flow of air to the engine is reduced which results in a rich fuel mixture and a rough running engine. Leaning the mixture corrects the problem but at the expense of engine power. When more ice forms, further leaning is required. Carburettor heating will melt the ice and allow normal power to be restored. The pilot in this case did not apply carburettor heat, although the aircraft was so equipped, because he did not correlate the symptoms with the cause.

The aircraft was damaged during the forced landing because there was no suitable area for landing. The pilot was flung forward during the impact and hit his head on the cockpit structure. Had he been wearing the shoulder harness, he probably would have been uninjured.

FINDINGS:

Cause Related:

1. The engine lost power because of the formation of carburettor ice.
2. The pilot did not use carburettor heat to remove the ice.
3. The aircraft was damaged when it was landed on an unprepared surface.

Other:

-Nil-

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PIPER PA28-RT-W01T CHEROKEE C-GRQE
ANGLEMONT, BRITISH COLUMBIA
08 OCTOBER 1984

REPORT NUMBER: 84-P40060 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1010 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	550	394
LAST 90 DAYS	48	48

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	1	2

SUMMARY REPORT:

During the approach to the threshold of a 2,300-foot upslope mountain runway, the aircraft suddenly dropped. It struck the ground short of the threshold in a flat attitude, with the landing gear retracted, and then skidded to a stop on the runway.

The pilot, who was unfamiliar with the airstrip, was concerned whether his aircraft would be able to stop within the runway available. During the final approach, he was so preoccupied with touching down on the threshold at the lowest possible speed that he forgot to lower the landing gear. Performance figures extracted from the pilot's operating handbook show that the aircraft required only 1,600 feet to land off a normal approach.

This aircraft is equipped with both a stall warning horn and an automatic gear lowering system. The stall warning circuit-breaker was found to be popped. It could not be determined whether it had popped prior to the accident or as a result of the accident. The landing gear extended normally when the aircraft was lifted from the runway, and no malfunction of the auto-extension-off light or of the gear unsafe horn and light was found. It appears that the pilot may have engaged the auto-extension override, which would have prevented the gear from lowering automatically, although the warning lights and horn would have still functioned. However, neither the pilot nor the passengers recalled seeing or hearing any indications from the warning systems.

FINDINGS:

Cause Related:

1. The pilot forgot to lower the landing gear because he was preoccupied with making the approach to a one-

Aviation Occurrence Reports

way strip which he considered to be of marginal length for his aircraft.

2. The pilot allowed the aircraft to stall on approach.

Other:

1. The automatic gear extension system did not lower the gear, and its guide unsafe horn and warning light were not heard or seen by the pilot or passengers.

2. The stall warning circuit-breaker was found to be in the tripped position after the occurrence and may have been in this position on approach.

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ROCKWELL COMMANDER 112B C-GOYO
LONDON AIRPORT, LONDON ONTARIO
24 OCTOBER 1984

REPORT NUMBER: 84-O44080 (Incident)

LOCAL TIME: 0903 EDT

OPERATION: Private Recreational

DAMAGE: Minor

PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	260	140
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was on a private flight from Grand Bend, Ontario, to London, Ontario. As the aircraft was joining the circuit at London, all communication was lost with the tower. The aircraft landed wheels up causing damage to the propeller, the nose gear doors, and one aileron hinge.

The aircraft had suffered a total electrical failure. Examination of the electrical system revealed that a nut on the battery master solenoid was loose and could be removed by hand. The nut fastened a cable from the main busbar to the solenoid. The draw of heavy current which occurred when the landing gear operating system was activated caused the loose connection in the battery circuit to fail, resulting in a total electrical failure.

It was further determined that the solenoid was not the original part, nor was it an authorized replacement part. The connections are covered with rubber boots and are not readily visible. There was no entry in the log books

to indicate that the solenoid had been replaced. Although the tower controller observed that the landing gear was not extended when communication was lost, he did not use any light signals to prevent the pilot from landing. The pilot was aware that an electrical failure had occurred and he selected the gear down thinking that the gear would free fall to the down position. The pilot did not use the emergency extension system. During the investigation both the normal and the emergency landing gear extension systems functioned satisfactorily.

FINDINGS:

Cause Related:

1. The electrical system failed when the pilot attempted to lower the landing gear.
2. The pilot did not use the emergency gear extension procedure.
3. The system failed due to the faulty installation of the solenoid.
4. The loose solenoid connection could not be easily detected during routine inspections.
5. The tower controller did not use any light signals to prevent the pilot from landing since the landing gear had not been extended.

Other:

1. It could not be determined who had replaced the solenoid or when the replacement had been installed.
2. The solenoid was not the original part, nor was it an authorized replacement part.

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MOONEY M20A SCOTSMAN C-GMTC
PONOKA INDUSTRIAL AIRPORT, ALBERTA
04 NOVEMBER 1984

REPORT NUMBER: 84-W40072 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1855 MST
OPERATION: Private Testing
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,800	900
LAST 90 DAYS	60	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot and one passenger were on a night return flight from Edmonton to Calgary when the engine began to run rough. The aircraft was about 15 miles south of Edmonton International Airport at that time. The pilot throttled back, and the engine smoothed out, but the pilot was unable to maintain altitude, and he decided to land at Ponoka, the nearest available lighted airport.

The pilot examined the aircraft at Ponoka and discovered that the spinner had started to peel off and a large section of the spinner was protruding outward. The pilot removed the spinner in order to confirm that the defect was the cause of the engine roughness. He then proceeded to test fly the aircraft, leaving his passenger at the terminal. He taxied out onto the runway and completed a full-power engine check. The engine appeared normal, and the pilot took off. At 200 feet above the runway, there was a loud bang, and the engine stopped. The pilot attempted a restart to no avail. As the aircraft neared the ground, the pilot attempted to hold the aircraft off in a nose-high attitude while the stall warning horn was sounding. The aircraft mushed almost vertically into the snow-covered ground just off the end of the runway. The landing gear collapsed and was forced up through the aircraft wings.

The aircraft fuel system was examined in detail. A number of deficiencies were found including the lack of a fuel strainer screen and a drain plug lockwire, a crushed finger screen, and contamination in the fuel pump and carburettor bowl. These deficiencies indicated that the system had not been maintained in accordance with the manufacturer's instructions. The deficiencies allowed the accumulation of dirt and water in the carburettor which, in turn, resulted in the engine stoppage due to fuel starvation.

Although the flight had been conducted at night, no record of a night endorsement for the pilot could be found. The pilot did, however, have considerable experience on type, and it is most likely that in the four years that he had owned the aircraft, he had accumulated night experience without the benefit of an endorsement.

Because the aircraft was held off in a nose-high attitude during the forced landing, it mushed almost vertically into the ground; as a result, the landing gear collapsed and was forced up through the aircraft wings.

FINDINGS:

Cause Related:

1. The fuel system had not been maintained in accordance with the manufacturer's instructions thus allowing a buildup of dirt and water in the carburettor.

Other:

1. The flight was made at night, and the pilot was not endorsed for night flying.

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Aviation Occurrence Reports

RISK OF COLLISION BETWEEN: BEECH C-23
SUNDOWNER C-GGDV and BEECH 200 KING
AIR C-GPNB
OTTAWA INTERNATIONAL AIRPORT, ONTARIO
04 NOVEMBER 1984
LOCAL TIME: 1140 EST
INFORMATION SOURCE: Field Investigation

BEECH C-23 SUNDOWNER C-GGDV

REPORT NUMBER: 84-O/44084 (Incident)
OPERATION: Private Recreational
DAMAGE: None
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	800+	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

BEECH 200 KING AIR C-GPNB

REPORT NUMBER: 84-O/44084 (Incident)
OPERATION: Unknown
DAMAGE: None
PILOT LICENCE: Unknown

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	Unknown	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	Unknown
PASSENGERS	-	-	Unknown

SUMMARY REPORT:

A runway incursion incident occurred when a Sundowner taking off from runway 22 flew over top of a King Air taxiing across runway 22. Both aircraft pilots were operating as cleared by tower controllers.

The incident occurred in daylight conditions, and the weather and visibility were good. Because of obstructions, a significant area around the button of runway 22 cannot be seen from the tower.

The King Air landed on runway 25 and had to taxi across runway 22 to the parking area; however, the pilot was told he would have to hold short of runway 22. The Sundowner was waiting at the button of runway 22 for

take-off clearance. At 1641:30, the tower controller cleared the Sundowner for take-off with no delay, and, at 1641:37, the King Air pilot reported on ground frequency that he was holding short of runway 22. At 1641:56, the ground controller cleared the King Air across runway 22 with no delay as there was traffic (Tango Lima Tango) on final. Also at 1641:56, the tower controller advised TLT to continue number one, and that there was crossing traffic (the King Air) at midfield.

The ground controller coordinated with the tower controller prior to clearing the King Air to cross runway 22. The tower controller gave authority to the ground controller to clear the King Air across runway 22 before he ascertained the whereabouts of the Sundowner, which he had cleared for take-off about 20 seconds earlier. In the one and one-half minutes prior to clearing the Sundowner for take-off, the tower controller cleared one aircraft for take-off and another for a touch-and-go on runway 22. During the coordination regarding the King Air, an aircraft took off from runway 22, and it is possible the tower controller may have mistaken this aircraft for the Sundowner, or he momentarily forgot about the Sundowner.

FINDINGS:

Cause Related:

1. The tower controller cleared an aircraft to cross a runway from which he had just cleared another aircraft to take off.

Other:

1. A significant area around the button of runway 22 is not visible from the tower because of obstructions.

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PIPER PA-28-151 WARRIOR C-GQES
LES CEDRES, QUEBEC
07 NOVEMBER 1984

REPORT NUMBER: 84-Q40092 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0925 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	227	18
LAST 90 DAYS	7	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The aircraft took off after taxiing for 3,000 feet and was at an altitude of 290 feet when the engine suddenly lost power. The pilot was unable to regain climb power. Since the power still available was insufficient for level flight, the pilot attempted a forced landing in a ploughed field. During the landing roll, the landing gear was torn off, and the aircraft came to rest on its belly.

The pilot actuated the fuel strainer drain without using a test tube, and he was accordingly unable to establish whether the fuel contained water. As the temperature was minus two degrees Celsius and the dew point was minus nine degrees Celsius, there was only a slight possibility of carburettor icing. On impact, the gas filter was torn from its attachment points and emptied. It was therefore not possible to analyse its contents to establish, in particular, whether water or ice was present. The aircraft had been outside overnight with its tanks half full, and there was frost on it in the morning.

Ground testing undertaken after the accident established that the engine was operating normally. During the investigation it was also discovered that a portion of the exhaust had been missing for some time. Laboratory examination established that the failed part in the muffler had not hindered the discharge of exhaust gases during the flight in question.

There was water in the fuel system as a result of condensation in the half-full tanks. As a result of the lowering in temperature below the freezing point during the previous night, ice crystals may have formed in the fuel system and reduced the rate of flow. The investigation did not, however, find sufficient evidence to confirm this theory.

The following laboratory report was completed: LP 405/84 - Examination of Muffler.

FINDINGS:

Cause Related:

1. During the initial climb after take-off, the engine suddenly lost power for undetermined reasons.

2. Since the power available was insufficient for level flight, the pilot attempted a forced landing in a ploughed field. The landing gear was torn off during the landing.

Other:

1. The method used to drain the fuel before departure did not allow the pilot to establish the condition of the fuel.

2. A length of the muffler main pipe had failed some-time before, but this failure did not hinder discharge of the exhaust gases during the accident flight.

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CESSNA 150L C-GNXI
WELLAND AIRPORT, WELLAND, ONTARIO
02 DECEMBER 1984

REPORT NUMBER: 84-Q40079 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1510 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	348	222
LAST 90 DAYS	14	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot took off from Fort Erie Airport on a visual flight rules (VFR) flight to Welland Airport with the intention of fuelling the aircraft at Welland. Prior to departure, he checked the fuel gauges and felt that he had sufficient fuel to complete the flight, a distance of 16.5 nautical miles.

As the aircraft approached the Welland Airport, the pilot advised that he would be joining a left downwind leg for runway 23. The aircraft then descended from 3,500

Aviation Occurrence Reports

feet to circuit height and as it joined the circuit for runway 23, the engine began to sputter and then stopped. Realizing that the aircraft would not be able to reach runway 23, the pilot decided to attempt a landing on runway 29 which was located directly below him. He completed the emergency checks, lowered the flaps to 15 degrees, and turned the aircraft to line up with runway 29. As the pilot attempted to lose altitude rapidly, the airspeed was allowed to increase; consequently the pilot was unable to land and had to overshoot the runway. He then made a left turn hoping to land on runway 05. There was insufficient altitude to reach runway 05, so the pilot force-landed the aircraft on a ploughed field. On touchdown the aircraft nosed over.

The investigation revealed that the aircraft had been fuelled to capacity one month prior to the accident flight. According to the journey log, the pilot had flown three flights for a total of four hours flight time. Fuel calculations indicated that there was approximately one gallon of usable fuel on board when the aircraft departed Fort Erie. As a consequence, the engine stopped because of fuel Exhaustion.

FINDINGS:

Cause Related:

1. The aircraft contained insufficient fuel for the planned flight.
- 2 The forced landing approach to the airport was misjudged.

Other:

- Nil -

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CESSNA 150B C-GARF
QUEBEC AIRPORT, QUEBEC
21 DECEMBER 1984

REPORT NUMBER: 84-Q40094 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1222 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	114	28
LAST 90 DAYS	28	28

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot removed his aircraft from the snow that covered the parking area, then he removed the tiedowns, and started the engine with the electric starter. The pilot moved the aircraft, under power, toward an open area, then switched off the engine and went to file a flight plan. When he returned, he tried to start the engine but could not, and the battery lost its charge. The pilot then positioned the aircraft so that the wheels were up against a small pile of snow left by the snowplough; he locked the brakes in the parking position and started the engine by hand. After the engine started, it accelerated rapidly. The pilot rushed toward the cockpit to close the throttle, but the propeller wash pushed the door shut as he approached it. The speed of the engine then increased, and the aircraft moved forward; it travelled about 400 feet and struck an aircraft parked on the other side of the parking area. The right wing of the parked aircraft was substantially damaged by the propeller of the runaway aircraft, which was also substantially damaged.

The pilot stated that the throttle control of this aircraft does not have a device to prevent it from moving forward toward the open position. The pilot also mentioned that the parking brake cannot hold the aircraft back after power is increased. The aircraft manual does not give instructions for starting the engine by hand.

After the engine started, vibration caused the throttle control to move forward gradually, which led to an unexpected increase in engine speed. As a result, the aircraft moved forward out of control. The small pile of snow against the wheels and the parking brake could not adequately secure the aircraft.

CONCLUSIONS:

Cause Related:

1. After the engine was started by hand with no one at the controls of the aircraft, the vibration caused the throttle control to move forward, and the power increased.

2. The aircraft was not adequately secured, and it moved forward out of control and struck a parked airplane.

Other:

- Nil -

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MOONEY M20K N231PF
SAINT-ANDRÉ-AVELLIN, QUÉBEC
04 JANUARY 1985

REPORT NUMBER: 85-Q50901 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (U.S.A.)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,000	300
LAST 90 DAYS	80	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was departing Saint-André-Avellin, Québec on a flight to Burlington, Vermont. During the take-off run, the aircraft pulled sharply to the left, and the pilot realized that the aircraft had gone off the side of the runway. He attempted to correct using brake and rudder; however, the aircraft continued to the left. The aircraft spun around before coming to a stop.

The pilot estimated that the visibility during departure was approximately one mile. There was light snow falling and overcast clouds at 1,000 feet above ground. This cloud layer was reported to be 10,000 feet thick. The accident occurred one minute after sunset.

The runway measures 3,600 feet by 75 feet and is not equipped with runway lights. Flare pots are available; however, these were not lit at the time of the accident. The runway was covered with a one-half to three-quarter-inch layer of fresh snow.

The Board was notified of the accident seven days after its occurrence. Since then, the runway had been ploughed several times.

Because all evidence that could have led to the determination of the cause of the runway excursion had disappeared by the time that the Board was notified, the Board could not determine why the aircraft ran off the side of the runway.

Because of the poor visibility, the diminishing light conditions, and the lack of definition of the runway perimeter, the pilot did not have reliable visual references to complete a safe take-off.

FINDINGS:

Cause Related:

1. The aircraft ran off the side of the runway for unknown reasons.

Other:

1. The pilot elected to take off in conditions which did not permit reliable visual reference during the take-off run.

2. The Board was notified of the accident seven days after its occurrence.

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CESSNA 182H CF-SBW
LETHBRIDGE, ALBERTA
05 JANUARY 1985

REPORT NUMBER: 85-W50002 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1232 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	79	10
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot, accompanied by her two children, taxied out from the Lethbridge terminal building for a departure on runway 23. The tower controller informed the pilot that

Aviation Occurrence Reports

the surface wind was 240 degrees magnetic (M) gusting to 30 knots. Taxiway Alfa, from the terminal area to the button of runway 23, is oriented 180 degrees M. The pilot stopped at the hold line on taxiway Alfa for runway 23 and requested take-off clearance. She was advised that the wind was 240 degrees M gusting to 40 knots and was cleared for take-off. As she released the brakes, a gust lifted the right wing and the tail, and the aircraft overturned.

The pilot had little experience operating in strong gusty wind conditions and stated that she had no idea that the intensity of the wind could increase so quickly. Although the surface wind was down runway 23, it was 60 degrees off taxiway Alfa. It is likely that the aircraft was stopped at the hold line on a 180-degree M heading. The strong cross-wind from the right overturned the aircraft when the brakes were released.

FINDINGS:

Cause Related:

1. The pilot taxied the aircraft in surface wind conditions which, considering her experience level, were too strong for safe aircraft operation.

2. The right wing was lifted by a gust of wind, and the aircraft overturned.

Other:

- Nil -

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CESSNA 150L CF-IZP
GREEN LAKE, BRITISH COLUMBIA
08 FEBRUARY 1985

REPORT NUMBER: 85-P50002 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1610 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Senior Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,100	1,000
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

En route from Langley, British Columbia, to 100 Mile Airport, the pilot diverted to the Flying U Ranch to check the condition of the airstrip. He selected carburettor heat on and descended about 2,000 feet to overfly the airstrip at 500 feet above ground level (agl). During the overshoot, the pilot applied full power and selected carburettor heat off. At 1,000 feet agl, the engine (Continental O-200-A) stopped, sputtered a bit, then stopped again. The pilot force-landed the aircraft on a frozen lake. When the nosewheel touched down, it dug into the snow, and the aircraft nosed over.

The investigation revealed the presence of water in the carburettor and in the gascolator. There was no evidence of any other engine or aircraft malfunction. The origin of the water was not determined.

FINDINGS:

Cause Related:

1. The engine stoppage was a result of water contamination in the fuel.

2. The origin of the water contamination was not determined.

Other:

-Nil-

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CESSNA 150-F CF-FXN
UNDERHILL, MANITOBA 4.5 mi S
10 FEBRUARY 1985

REPORT NUMBER: 85-C50009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	48	15
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger planned to take off from their private, 1,200-foot farm airstrip for a local flight. Acceleration of the aircraft during the take-off run was normal, and, after the aircraft had travelled about 800 feet on the ground, the pilot pulled back on the control column. The nosewheel lifted off, but the aircraft did not become airborne. The control column was moved further aft, and the aircraft became partially airborne near the end of the airstrip; the aircraft banked to the right, and the right wheel remained in contact with deep snow on the field. After the aircraft had travelled about 550 feet past the end of the runway, the main wheels struck a snow-drift; the nose gear collapsed, and the aircraft came to rest in a nose-down attitude.

The weather conditions were suitable for the flight; the sky was clear, the visibility was 15 miles, the wind was calm, and the temperature was minus 20 degrees Celsius. There were no pre-accident aircraft failures or malfunctions discovered or reported, and the aircraft weight and balance were within allowable limits.

The take-off roll for this flight, considering the temperature, field elevation (1,450 feet above sea level), air temperature, and the condition of the runway surface (some loose snow), should have been about 700 feet. The aircraft stall speed at maximum weight is about 48 knots.

Prior to the flight, the runway had been cleared of snow, and the pilot had brushed all the snow off the aircraft wings. During the take-off run, the last observed airspeed was 55 knots, and the aircraft was still accelerating; however, it did not become airborne.

FINDINGS:

Cause Related:

1. The aircraft did not become airborne at the normal take-off speed, for undetermined reasons.

Other:

-Nil-

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BELLANCA 7GCBC C-GWTK
ERSKINE, ALBERTA 3 mi SE
01 MARCH 1985

REPORT NUMBER: 85-W50009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1330 MDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	320	75
LAST 90 DAYS	25	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The wheel-equipped aircraft was landing on a snow-covered field to drop off supplies for an oil rig. Shortly after touchdown, the main wheels broke through the surface of the snow, and the aircraft nosed over.

The pilot had surveyed the landing area on foot the previous day. However, overnight, the temperature had dropped from +15 degrees Celsius to -10 degrees Celsius causing a thick crust to form on the snow. The pilot was not aware of the change in snow conditions when the landing was attempted.

Had the pilot judged the landing area as unsafe for wheel operations, he could have used the Stettler Airport five miles away with minimal inconvenience.

FINDINGS:

Cause Related:

1. The pilot was not aware of the snow conditions when the landing was attempted.

Aviation Occurrence Reports

2. Shortly after touchdown, the main wheels broke through the snow crust causing the aircraft to nose over.

Other:

- Nil -

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CESSNA 170B C-FYBF
MARATHON AIRPORT, ONTARIO
02 MARCH 1985

REPORT NUMBER: 85-O/50009 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1621 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	260	175
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

After a one hour local flight, the pilot returned to the airport for a landing. Following touchdown in a 90-degree cross-wind from the left at 10 knots, the aircraft ground looped to the right and came to rest against a snowbank beside the runway. The aircraft sustained damage to the right wing, the elevator, and the landing gear.

At the time of the landing, the runway surface was bare and dry. The cross-wind component was at the maximum recommended limitation for a light aircraft. The pilot reported that he had used 10 degrees of flaps and that, after touchdown, an unexpected gust of wind lifted the wing and caused the aircraft to ground loop. The use of flaps in such wind conditions will tend to produce more lift on the upwind wing and make control of the aircraft more difficult. Tail-wheel equipped aircraft will ground loop easily if the proper control technique is not applied following touchdown, especially in gusty wind conditions. However, it was not determined what technique the pilot employed. He was not able to regain control once the aircraft started to ground loop.

FINDINGS:

Cause Related:

1. Following touchdown, the pilot lost control of the aircraft.

Other:

-Nil-

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PIPER PA-31-350 C-GRWP
ST. ANTHONY, NEWFOUNDLAND
14 MARCH 1985

REPORT NUMBER: 85-A50003 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1515 NST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	5,000	1,000	460	90
LAST 90 DAYS	261	261	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft was dispatched on a personal transportation flight. On arrival at destination, the pilot-in-command carried out the published instrument flight rules (IFR) approach, which required a circling manoeuvre to the runway. Because of the ceiling and reduced visibility in drizzle and fog, a missed approach was carried out, and a second approach was commenced. During the circling manoeuvre on the downwind leg, the pilot flew low and close to the runway. The aircraft struck a radio antenna tower located 2,250 feet north of the runway threshold. The aircraft was damaged; however, control was maintained, and the aircraft was landed safely.

The pilot was familiar with the area and was aware of a 208-foot above sea level (asl) tower north of the runway. The tower that was struck was 230 feet asl and had been recently erected in the same area as the one shown on the approach plate. The required vertical separation indicated on the approach plate was predicated on the height of the old tower, and the approach plate had not been amended to show the change.

The investigation revealed that in order to maintain visual contact with the runway during the circling manoeuvre, the pilot had to fly closer than normal to the runway while on the downwind leg. He initiated a descent while downwind in order to position the aircraft for the final approach. This modified approach procedure resulted in the aircraft striking the tower. The tower would have been avoided if the circling procedure had been flown in accordance with the published approach procedure. The weather conditions in which the pilot attempted the circling manoeuvre were below the published minima on the approach plate and were unsuitable for the safe completion of the approach. Regional action has been taken by Transport Canada to correct the circling approach minima.

FINDINGS:

Cause Related:

1. A runway circling manoeuvre was attempted in weather conditions that were below the minima published for the IFR approach procedure.
2. During the circling manoeuvre, the aircraft was not flown in accordance with the published procedure and was allowed to descend; as a result, it struck a tower.

Other:

1. The approach plate had not been amended to reflect the change in obstacle clearance.

SAFETY ACTION:

Action Taken:

1. Regional action has been taken by Transport Canada to correct the circling approach minima and reflect the change in obstacle clearance.

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CESSNA 172D C-FWKV
LURICON LAKE, ALBERTA 3 mi W
20 MARCH 1985

REPORT NUMBER: 85-W50011 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1100 MST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	160	160
LAST 90 DAYS	41	41

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot had completed a long en-route descent toward the oil rig where he intended to make a low pass - the pre-arranged signal for someone to pick him up at the local aerodrome. When he levelled the aircraft and increased the throttle setting, the engine ran rough and lost power. The pilot applied carburettor heat and carried out a forced landing on a nearby north-south gravel road. During the landing roll, the aircraft veered to the right, and the pilot applied engine power in an attempt to control the swing. The engine responded; however, the right wing struck a fence post beside the road. The aircraft ground looped off the road and came to rest on its nose in a field.

At the time of the forced landing, the surface wind was gusting from the west at 25 knots. The aircraft had touched down in the lee of some trees, and directional control was lost when the aircraft emerged from behind the protection of the trees.

The engine was test run and found to be operating normally.

The air and dew point temperatures at ground level were plus two and minus seven degrees Celsius respectively, and the Alberta Weather Centre estimated that the air and dew point temperatures at cruising altitude were minus two and minus seven degrees Celsius respectively. According to the Transport Canada Aeronautical Information Publication (AIP) Canada, moderate carburettor icing could be expected at these temperatures.

The pilot, who was the aircraft owner, held only an expired student pilot permit. This flight was made, as were previous flights, without the supervision of an instructor.

Aviation Occurrence Reports

The descent had been made without carburettor heat, and, as a result, carburettor ice formed, causing the engine to run rough. The subsequent use of carburettor heat cleared this ice by the time the aircraft had landed, and, consequently, the engine responded when the pilot attempted to use power to regain directional control.

FINDINGS:

Cause Related:

1. Carburettor ice formed during a long descent at low engine power without carburettor heat, causing the engine to lose power temporarily.
2. The pilot was unable to maintain directional control in the gusty cross-wind.

Other:

1. The flight was made without the supervision of an instructor.

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CESSNA 170B N3453C
ONE HUNDRED MILE HOUSE, BRITISH
COLUMBIA
12 APRIL 1985

REPORT NUMBER: 85-P50901 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	200	190
LAST 90 DAYS	66	66

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1
OTHERS	-	-	3

SUMMARY REPORT:

After taking off from runway 08 at One Hundred Mile House, the pilot noticed that the aircraft was not climbing and that the stall warning was sounding intermittently. As there was rising terrain ahead, the pilot turned right into wind and attempted to accelerate. However, he was unable to maintain ground clearance, and he elected to land on a highway. During the touchdown and landing roll, the aircraft collided with two trucks.

The investigation revealed low compression in one cylinder which reduced the maximum power available from the engine by approximately 100 rpm.

The take-off was made using 20 degrees of flap; the manufacturer's recommended procedure is to use no flap except for soft or rough fields with no obstacles ahead. A notice in the Canada Flight Supplement entry for One Hundred Mile House warns that severe downdrafts may be encountered when taking off to the east.

Contrary to the manufacturer's recommended procedures, the pilot used 20 degrees of flap for the take-off, and, as a result, the aircraft's rate of climb was reduced. It is also likely that the aircraft encountered a downdraft which further decreased its climb rate, and, as a result, the aircraft could not clear the rising terrain.

FINDINGS:

Cause Related:

1. The engine was not developing full power, and the pilot did not use the recommended flap setting for take-off; as a result, the aircraft's climb performance was reduced.
2. Unable to maintain ground clearance, the pilot force-landed on a highway and collided with two trucks.

Other:

-Nil-

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PIPER PA-28-151 C-GNBP
OUTLOOK, SASKATCHEWAN
28 APRIL 1985

REPORT NUMBER: 85-C50019 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1400 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	62	50
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot lined up the aircraft for take-off from a grass airstrip. The aircraft became airborne after a normal ground roll, but shortly after lift-off, the pilot noticed a rapid decrease in airspeed, and the aircraft sank back onto the runway. The pilot cut the power and attempted to stop on the remaining length of the airstrip; however, the aircraft overran the end of the runway and continued into a hedge causing damage to the nosewheel, propeller, and both wings.

The investigation revealed that the winds were gusty and variable at the time of take-off. This condition combined with the pilot's level of experience resulted in the aircraft becoming prematurely airborne at an airspeed that was insufficient to compensate for the variable winds.

FINDINGS:

Cause Related:

1. The aircraft became airborne at an airspeed that was insufficient to compensate for the variable winds.

Other:

- Nil -

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CESSNA 177A C-FXQK
BLACKIE, ALBERTA
01 MAY 1985

REPORT NUMBER: 85-W50015 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1215 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	186	10
LAST 90 DAYS	11	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

In an attempt to carry out a maximum performance take-off from a short dirt strip, the pilot selected 15 degrees of flap, applied power and applied constant back pressure to the elevator control. The aircraft lifted off at 50 miles per hour, three-quarters of the way down the strip. The aircraft settled back to the runway twice, and, once it was airborne, the pilot retracted the flaps to 10 degrees and initiated a shallow left bank to clear trees and power lines. The aircraft began to settle again; so the pilot retarded the throttle, and the aircraft touched down beyond the runway in a slough and nosed over.

The aircraft owner's manual states that a maximum performance take-off requires 15 degrees of flap and an airspeed of 65 miles per hour with no flap retracted until clear of all obstacles. Examination of the aircraft determined that the flap system had been rigged in such a manner that actual flap extension was five degrees less than indicated.

The pilot did not follow the procedure laid out in the aircraft handbook for a maximum performance take-off; he did not obtain adequate speed prior to lift-off, and he then retracted the flaps prematurely. Incorrect flap rigging detracted from climb performance by providing five degrees less flap extension than indicated.

FINDINGS:

Cause Related:

1. The pilot did not follow the manufacturer's procedure for a maximum performance take-off.
2. Incorrect flap rigging resulted in five degrees less flap extension than indicated.

Aviation Occurrence Reports

Other:
-Nil-

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AVIATION OCCURRENCE REPORT
NORTHROP CORPORATION
F-20A TIGERSHARK N3986B
GOOSE BAY, LABRADOR, NEWFOUNDLAND
14 MAY 1985

REPORT NUMBER 85-H50901

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,240	154
LAST 90 DAYS	84	39

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT

At 1345 Atlantic daylight time (ADT), 14 May 1985, the Northrop F-20A Prototype aircraft, GI-1001, United States of America civil registration N3986B, took off from Goose Bay Airport runway 08 on a five-minute practice demonstration flight, in preparation for the Paris Air Show. The flight was the sixth demonstration flight flown that day on the aircraft and the fourth flown by the accident pilot. The demonstration flight was to be centred at the mid-point of the runway and had been authorized by the appropriate Canadian authorities. The final manoeuvre sequence of the scheduled routine, which had been previously flown about 60 times by the pilot, called for a simulated head-on, low-level, air-to-ground attack followed by a sharp 9G pull-up at approximately 380 knots. This sequence was to be followed by level flight, left aileron rolls as necessary to provide adequate spacing from the runway, prior to entering a left downwind and base turn for landing.

Film taken of the mishap sequence shows that the aircraft entered an apparently normal right rolling pull-up following the low-level attack manoeuvre. The aircraft then completed one and one-half rolls to the left, then momentarily hesitated in the inverted position. The left roll was then continued as a barrel roll, which resulted in a descending roll-out to a wings-level attitude with about a 16-degree nose-low pitch attitude. The aircraft's heading was almost reciprocal to that required for the intended downwind and landing pattern. The landing gear was not extended. The aircraft continued descending, slightly increasing its nose-down pitch attitude until it struck open, snow-covered, fairly level terrain in an upright, slightly left-wing- low, nose-

down attitude. The aircraft was destroyed at impact, and the pilot sustained fatal injuries.

The mishap occurred less than one mile north of the Goose Bay Airport runway 08 at lat 53°19'N, long 60°26'W at an elevation of 160 feet above sea level (asl). The accident occurred at 1349 during the hours of daylight.

ANALYSIS

The accident occurred on the sixth practice air show flight of the day; it was the fourth of the day for the accident pilot. The flight appeared normal until the last sequence of the air display. The aircraft deviated from the planned flight path by hesitating for approximately one second in inverted flight, following a roll that was not smoothly flown. A barrel roll-type manoeuvre was observed, and the aircraft crashed while in a slightly left-wing-down attitude on a heading opposite to that expected to place the aircraft on downwind to runway 08.

The weather at the time of the accident was suitable for the intended flight. The aircraft was clearly visible to ground observers throughout the demonstration flight and, at no time, did it enter cloud. The terrain features provided a good horizon reference in the area of the accident, eliminating the likelihood of visual illusions.

Air show displays, of the type planned for the F-20, place the pilot and aircraft in situations where safety margins are reduced. Both pilot and machine are operating near their limits and a small amount of time (altitude) is available for recovery, following an aircraft problem or a physiological event experienced by the pilot.

CONCLUSIONS

Cause-Related Findings

1. The pilot became incapacitated at least to some degree during or following the final high-G pull-up manoeuvre and did not recover sufficiently to prevent the aircraft from striking the ground.
2. The low altitude used in the flight demonstration reduced the time available to regain control of the aircraft following a temporary incapacitation of the pilot.
3. The pilot suffered from achalasia which reduced his G tolerance, and this condition was not disclosed to his examining physician.

4. The pilot's ability to achieve a maximal anti-G straining manoeuvre could have been impaired by his undisclosed medical condition.

5. The pilot had not received formal aeromedical training pertaining to the GLC phenomenon, and no evidence was found that GLC training was required prior to participation in high-G demonstration flights.

6. In the two and one-half hours prior to the accident, the pilot participated in four high-G demonstration flights requiring repetitive, rapid onset, high-G exposure in addition to sustained moderate-G exposure which lowered his G tolerance.

Other Findings

1. There was no evidence of any failure or malfunction of the aircraft or any of its systems.

2. The close proximity of the aircraft battery and the flight control computer (FCC) made the FCC vulnerable to damage from electrolyte fluid leaks.

3. The pilot was licensed and qualified to conduct the flight in accordance with existing regulations.

4. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

5. The aircraft weight and centre of gravity were within the prescribed limits.

6. A cockpit video recorder had been removed prior to the demonstration flights.

7. The aircraft was not equipped with a cockpit voice recorder or a flight data recorder, and neither was required by regulation.

SAFETY ACTION

Action Taken:

The Canadian Aviation Safety Board (CASB) notes the following action taken by the aircraft manufacturer as a consequence of this occurrence and the subsequent investigation:

a) Cooperative research has been undertaken by the manufacturer and the USAF School of Aerospace Medicine into the G loss of consciousness (GLC) phenomenon;

b) The manufacturer has requested that the United States Air Force (USAF) School of Aerospace Medicine allow company test pilots to undergo centrifuge familiarization and testing under high G conditions; and

c) Information briefings on the GLC phenomenon have been given to the manufacturer's foreign customers, as well as Northrop and USAF test pilots and engineers. These briefings have been supported by audio-visual presentations on actual GLC occurrences in flight and during centrifuge experiments.

The CASB recognizes that these efforts have contributed to a better understanding of the GLC phenomenon by the manufacturer, its foreign customers, and the USAF. It is also understood that parallel efforts within the Canadian Department of National Defence have been underway for some time. In an effort to further improve awareness of the GLC phenomenon, copies of this occurrence report are being made available to the Canadian Department of National Defence.

Action Required:

Awareness of the G Loss of Consciousness Phenomenon

The CASB notes that the GLC phenomenon can be caused by sustained high G loads and also by rapid G onset rates. It is recognized that due to performance limitations, civilian aerobatic aircraft are not able to sustain high G loads for as long a period of time as military-type high performance aircraft. However, acceleration rates for both positive and negative G loads are comparable for these two types of aircraft.

Based on discussions with Canadian civil aerobatic pilots and their representative organization, Aerobatics Canada, the CASB believes that there is a lack of current knowledge regarding the GLC phenomenon.

Therefore, the CASB recommends that:

The Department of Transport disseminate information regarding the G loss of consciousness phenomenon to the civilian aerobatic pilot community.

(CASB 86-17)

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Aviation Occurrence Reports

CESSNA 337G SUPER SKYMASTER C-GWMT
WINNIPEG/ST. ANDREWS AIRPORT, MANITOBA
17 MAY 1985

REPORT NUMBER: 85-C50026 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1027 CDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	600	155
LAST 90 DAYS	60	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

During initial climb after take-off, at an altitude of approximately 100 feet above ground level (agl), the pilot noted an appreciable reduction in climb performance. Suspecting an engine power loss and believing the aircraft would not maintain sufficient altitude to clear power lines and buildings 2,000 to 3,000 feet ahead, the pilot closed the throttles and carried out a landing on a muddy field off the runway end. The aircraft touched down hard, the landing gear collapsed, and the aircraft slid to a stop approximately 1,000 feet beyond the end of the runway.

Runway 31 is a 3,000-foot asphalt strip and is located 758 feet above sea level. The surface was bare and dry, lift-off occurred at about mid-strip, and the throttles were closed as the aircraft overflew the runway end. The temperature was 15 degrees Celsius, and the wind was from 280 degrees magnetic at 15 knots. The aircraft weight and centre of gravity were within prescribed limits.

Both engines (Continental IO-360-G) performed within normal parameters during run-up and take-off. The pilot did not notice any change in engine sound as the aircraft climb performance degraded, nor did he check the engine instruments for indications of a power loss. The loss of climb performance occurred before the pilot attempted to retract the landing gear or adjust the engine controls for climb power. No pre-impact failure or malfunction of the aircraft's systems which could account for the loss of climb performance was discovered.

The crankshaft propeller mounting flange of the front engine was found fractured. Laboratory examination revealed that the crankshaft had failed in overload as a result of propeller impact. No material deficiencies or

pre-existing cracks contributing to or associated with the failure were in evidence. Teardown of the front engine and functional testing of the rear engine did not reveal any discrepancies or irregularities.

Environmental conditions were suitable for the intended operation and would not have affected the aircraft's climb performance. Both engines were capable of producing sufficient power to ensure a normal climb. The cause of the sudden degradation in the aircraft's climb performance could not be determined.

The following laboratory report was completed: LP 116/85 - Crankshaft Failure.

FINDINGS:

Cause Related:

1. During climb-out, the aircraft's climb performance degraded appreciably for undetermined reasons, and the pilot carried out a forced landing, during which the aircraft was substantially damaged.

Other:

-Nil-

→ → → → →

CESSNA 140 C-FDRT
LABROQUERIE, MANITOBA 2 mi E
17 MAY 1985

REPORT NUMBER: 85-C50027 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1815 CDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,200	2
LAST 90 DAYS	120	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

On final approach to land in gusty wind conditions, the aircraft suddenly rolled left. The pilot was unable to level the aircraft using both aileron and rudder. The pilot stated that the aircraft stalled, and he could not complete a recovery before striking the ground.

The pilot was approaching into a 20-to 30-knot head wind. The aircraft was about 200 feet above the ground when control was lost. The pilot was unfamiliar with the aircraft type and had not received a check-out.

FINDINGS:

Cause Related:

1. The pilot was unfamiliar with the aircraft type.
2. During the final approach in gusty wind conditions, the pilot lost control of the aircraft.

Other:

- Nil -

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CESSNA 140 C-FZFO
EAGLESHAM AERODROME, ALBERTA
27 MAY 1985

REPORT NUMBER: 85-W50022 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2200 MDT
OPERATION: Private Ferry
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,425	9
LAST 90 DAYS	23	9

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

On arrival over Eaglesham, Alberta, the pilot circled the aerodrome to determine the wind direction and speed. He estimated that there was a 70-degree cross-wind from the left at approximately 10 knots. After landing, the pilot decided to carry out a touch-and-go. During the second landing, after a ground roll of 240 feet, the aircraft nosed over.

An examination of the ground marks on the runway indicated that the aircraft touched down in a wings-level attitude on its main landing gear and that the propeller struck the ground while the brakes were on prior to the aircraft nosing over.

Because the Cessna 140 tends to nose over when heavy braking is applied, the manufacturer has produced a

modification kit which moves the main landing gear forward two inches to reduce the aircraft's susceptibility to nosing over. This kit had been installed on the occurrence aircraft.

On the first landing attempt, the pilot stated he was not comfortable with the landing, and he carried out an over-shoot.

The pilot was experienced on heavier tail-wheel-equipped aircraft that were less susceptible to nosing over. Because of the cross-wind, the pilot was using brakes to maintain directional control, but before the tail wheel was on the ground. Even with the modified braking system installed, the pilot applied the brakes too harshly, and the aircraft nosed over.

FINDINGS:

Cause Related:

1. Brakes were applied for directional control before the tail wheel was on the ground.
2. When the pilot applied the brakes too harshly, the aircraft nosed over.

Other:

-Nil-

→ → → → →

FAIRCHILD F-27F C-FQYP
ST. JOHN'S AIRPORT, NEWFOUNDLAND
27 MAY 1985

REPORT NUMBER: 85-A50010 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1307 NDT
OPERATION: Private Company Business
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,000	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was being directed into a congested parking area by a marshaller. The parking area was in front of and between an executive jet aircraft and a military

Aviation Occurrence Reports

helicopter. As the pilot-in-command turned the aircraft through a 180-degree turn to the right, the left wing tip struck the trailing edge of one of the forward main rotor blades of the helicopter. The pilot-in-command continued the turn, and the wing rode up and over the rotor blade. The upper surface of the rotor blade was scored, and the damaged blade had to be replaced. The left wing navigation light identification plate on the F-27F was knocked off.

The marshaller was positioned to the right of the taxiing aircraft and he was unable to see the left wing during the turn. The pilot accepted the directions from the incorrectly positioned marshaller and, as a result, did not maintain adequate wing tip clearance.

FINDINGS:

Cause Related:

1. The marshaller was incorrectly positioned and was unable to see the left wing during the turn.
2. The pilot accepted the directions from the marshaller and, as a result, did not maintain adequate wing tip clearance.

Other:

- Nil -

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PIPER PA-22-150 CF-MDS
LAC COUSACOUTA, QUÉBEC
01 JUNE 1985

REPORT NUMBER: 85-Q50021 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1000 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	237	223
LAST 90 DAYS	6	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was making an approach to a landing strip located in a hilly region. On the latter part of the final approach, the aircraft began to sink. The pilot added

power, but the aircraft continued to sink, and it touched down short of the runway. On touchdown, the main wheels dug into the soft ground, and the aircraft nosed down.

The wind at the time of the accident was down the runway at 17 knots. A sizeable hill is located on the approach path to the runway, approximately 1,000 feet back from the threshold.

On the initial part of the approach, the aircraft was flying in an updraft created by the wind flowing up the hill on the approach path. As a result, to maintain the proper approach path, the pilot flew at a lower power setting than normal. Once the aircraft reached the upwind side of the hill, out of the updraft, the aircraft sank because of the reduced power setting. Although the pilot added power, he did not add sufficient power in time to prevent the aircraft from touching down short of the runway.

FINDINGS:

Cause Related:

1. When the aircraft began to sink on final approach, the pilot did not add sufficient power in time to prevent the aircraft from landing short of the runway.
2. On touchdown, the main wheels dug into the soft ground, and the aircraft nosed down.

Other:

-Nil-

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RISK OF COLLISION BETWEEN: LEAR JET 35
C-GVVA and CESSNA 310 C-GBLB
CALGARY INTERNATIONAL AIRPORT, ALBERTA
04 JUNE 1985
LOCAL TIME: 1340 MDT
INFORMATION SOURCE: Field Investigation

LEAR JET 35 C-GVVA

REPORT NUMBER: 85-W54058 (Incident)
OPERATION: Private Training
DAMAGE: None
PILOT LICENCE: Unknown

	PILOT-IN-COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	3,600	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	2	
PASSENGERS	-	-	-	

CESSNA 310 C-GBLB

REPORT NUMBER: 85-W54058 (Incident)
OPERATION: Unknown
DAMAGE: None
PILOT LICENCE: Unknown

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	N/A	N/A	
LAST 90 DAYS	N/A	N/A	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

SUMMARY REPORT:

Both aircraft were holding on runway 16 awaiting take-off clearance, the Lear Jet (GVVA) at the button of the 12,675-foot runway and the Cessna (GBLB) at Uniform intersection, half-way down the runway. GBLB was cleared for take-off; however, both aircraft took off. The Lear Jet passed about 3,000 feet over the Cessna just past the end of the runway.

GBLB was cleared on tower frequency at 1938:53 to position on the runway. At this time, the Lear Jet was still on ground frequency. At 1940:11, GVVA advised the tower that they were ready for take-off, and they

were cleared to position to wait (hold). At 1940:30, GBLB was cleared for take-off; GBLB acknowledged, and there was a squeal in the background indicating a simultaneous radio transmission. Both aircraft commenced take-off at this time. The two-man crew of the Lear Jet did not realize that the Cessna was on the runway, and they did not see the Cessna until half-way through their take-off roll. There was no doubt that the Lear Jet would clear the Cessna, so the take-off was continued.

The weather was good with scattered clouds, 40 miles visibility, wind 150 degrees at 20 knots, and temperature 20 degrees Celsius. The warm temperature caused heat waves to rise from the asphalt runway surface.

There was a vehicle waiting to cross runway 16 at the intersection of runway 25, and the tower controller planned to clear the vehicle once the Cessna had passed the intersection. The controller's attention was on the Cessna and not on the Lear Jet which he assumed to be holding at the button. The controller first noticed that the Lear Jet had taken off when it flew past the tower in a steep climb at about 1,500 feet above ground.

GVVA was cleared to position after the Cessna was stationary on the runway about 6,000 feet ahead of GVVA. Because of the small rear view of the Cessna, the distance between the aircraft and the shimmering effect of the heat waves, the crew of the Lear Jet did not see the Cessna. As well, when GBLB was cleared to position, GVVA was on a different radio frequency.

When GBLB was cleared for take-off on runway 16, the crew members of GVVA heard the clearance, and they both "knew" the clearance was for them; they believed they were the only ones waiting for take-off on runway 16. GVVA's acknowledgement of the clearance was overridden by GBLB's acknowledgement, and the controller was, therefore, unaware of the misunderstanding.

FINDINGS:

Cause Related:

1. The crew members of the Lear Jet did not see the Cessna on the runway because of the Cessna's size, its distance from the Lear Jet, and the effect of the heat waves.
2. The crew members of the Lear Jet interpreted GBLB's take-off clearance as their own because they thought their aircraft was the only one awaiting take-off clearance on runway 16.
3. The use of a speaker system rather than personal ear-phones was a factor in the poor radio reception for the crew members of the Lear Jet.

Aviation Occurrence Reports

Other:

-Nil-

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CESSNA A188B AG WAGON C-GWWC
HANNA, ALBERTA 17 mi NE

22 JUNE 1985

REPORT NUMBER: 85-W50030 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1145 MDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,100	500
LAST 90 DAYS	78	62

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

While spraying a field, and after making four passes at the south end of the field, the pilot noticed that he had forgotten to turn on his spray pump. The pilot started spraying the field again and, after several passes, decided to change his procedure and fly a "race track" pattern around the field. While turning to the right to approach the north end of the field, the pilot noticed that he was about 200 feet wide. He increased the angle of bank and used rudder in an attempt to turn the aircraft towards the edge of the field. The aircraft was in a steep turn to the right when the pilot noticed that the stall horn was sounding and that the control stick was shaking. This sharp turn did bring the aircraft back in line with the field; however, the aircraft was now travelling downwind and in a stalled or near stalled condition. The pilot rolled the wings level and pushed the aircraft nose down to gain airspeed; however, it failed to gain sufficient flying speed before contacting the ground.

When it became evident that the aircraft would hit the ground, the pilot planned on touching down and pulling the aircraft back into the air. Before the aircraft was able to become completely airborne again, it went through a barbed wire fence. The left wing was torn off as it struck the corner post of the fence. The aircraft rolled to the left, came down nose first into the field, then cartwheeled over the fence, and came to rest in an inverted position.

The pilot escaped serious injury because he was wearing a helmet and a shoulder harness and the cockpit retained its integrity.

Spray operations require the pilot to maintain visual contact with the ground. While so doing the pilot was not monitoring his airspeed and he allowed the aircraft to stall.

FINDINGS:

Cause Related:

1. The pilot stalled the aircraft during attempts to correct the approach to a spray run.

2. During the attempted stall recovery, the aircraft bounced and struck a fence post, causing the left wing to fail.

Other:

1. The pilot escaped serious injury because he was wearing a helmet and a shoulder harness and the cockpit retained its integrity.

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CESSNA 172K C-GPNU
ST-HONORE, QUEBEC 17 mi NNE
25 JUNE 1985

REPORT NUMBER: 85-Q50028 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2310 EDT
OPERATION: Private Ferry
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,300	2,000
LAST 90 DAYS	105	105

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	1	-	1

SUMMARY REPORT:

The aircraft was on a visual flight rules (VFR) flight from Wabush to St-Honoré, Quebec when it crashed in near-level flight close to the top of a 2,600-foot hill. One passenger was killed, and the pilot was seriously injured.

The weather at 2300 at Bagotville, 12 miles south of St-Honoré and about 30 miles from the crash site, was

reported as overcast cloud based at 3,500 feet above sea level (asl) with a visibility of 15 miles. St-Honoré, at 540 feet asl, is located in a wide, flat valley; however, the area 15 miles to the north and east of St-Honoré is mountainous with peaks to 3,175 feet asl.

The pilot was not instrument rated. He stated that he was flying just below an overcast cloud layer and that he flew lower and lower as the cloud base lowered. Because of the overcast condition and lack of moonlight or starlight, the night was very dark, and the pilot was navigating visually using lakes, but he could not distinguish the forest from other terrain. Twenty miles out of St-Honoré, as indicated by LORAN C navigation equipment, the pilot started to descend at about 300 feet per minute. Moments later, the aircraft struck the mountain.

The pilot did not enter cloud, and he reported seeing a red light off to his left just prior to the accident. Ground witnesses near the crash site heard the aircraft engine and saw the lights of the aircraft for about one minute. Shortly after the lights passed out of sight behind a hill, the witnesses heard the sounds of a crash. The witnesses stated that the tops of the mountains were in cloud.

The pilot, although he could not see the ground, flew at inappropriately low altitudes in order to remain clear of cloud, and he inadvertently flew into high ground.

FINDINGS:

Cause Related:

1. The pilot elected to continue VFR flight in adverse weather conditions.
2. The pilot descended in order to remain clear of cloud, and the aircraft struck high ground.

Other:

-Nil-

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CESSNA 170B C-FNNY
ST-GABRIEL-DE-BRANDON, QUEBEC
05 JULY 1985

REPORT NUMBER: 85-Q50031 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2105 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	820	40
LAST 90 DAYS	44	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The aircraft was on a visual flight from Mascouche to St-Gabriel-de-Brandon. Upon arrival at his destination, the pilot made a pass at 300 feet above runway 06 to ensure that it was clear. The aircraft touched down a short distance past the threshold, then rolled approximately 1,200 feet down the grass-covered runway. The pilot wanted to stop in front of his trailer, which was parked on the left side of the runway, and he pivoted his aircraft at an approximate speed of 25 mph. The left wheel sank into soft sand, and the aircraft fell onto the left wing and left horizontal stabilizer, then came to rest in an upright position.

The aircraft landed 11 minutes after sunset. The pilot knew the private grass and gravel strip well. The ground on the right side of the runway, where the accident occurred, was sandy and soft.

The aircraft could have been stopped on the ground before it reached the accident location, but the pilot continued to roll out so he could stop in front of his trailer. Because of the poor light conditions or because he simply forgot, the pilot did not realize that the runway surface in front of his trailer was too soft to turn on the ground at high speed. The resistance encountered by the wheels made the aircraft list momentarily to the left.

FINDINGS:

Cause Related:

1. The pilot executed a high-speed ground turn on the soft, sandy runway; as a result, the left wheel of the aircraft sank, and the resistance encountered by the wheels caused the aircraft to list to the left.

Aviation Occurrence Reports

Other:
-Nil-

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CESSNA U206E C-FAQH
JANVIER, ALBERTA
11 JULY 1985

REPORT NUMBER: 85-W50034 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0935 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,200	500
LAST 90 DAYS	140	140

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

Shortly after take-off, while at an airspeed of 95 knots and an altitude of 100 feet above the trees, the pilot noted a severe vibration coming from the engine, followed by a loss of power. The pilot immediately made a left turn back toward the runway but was unable to glide the distance. A forced landing was carried out into trees about 300 feet short of the aerodrome clearing. The pilot was seriously injured.

The aircraft had experienced several unexplained engine problems about three weeks prior to the accident. It had been ferried to Edmonton several times for repairs. The complaints were of engine roughness. During the period of maintenance, several adjustments to the fuel system were made, and a fuel line, which was found plugged, was cleaned. The aircraft was flown 24 times since the last repair work, and the pilot reported that the engine had been running well.

The post-accident examination of the engine and its related components revealed that dirt was restricting the orifice in the fuel pump, and it failed to operate when tested. Once the dirt was removed, the pump operated, but the pressure output was below the manufacturer's specifications. The cause of the engine failure was concluded to be the combination of dirt lodging in the pump orifice and a low pump pressure. The source of the dirt and the reason for the low pressure were not determined.

FINDINGS:

Cause Related:

1. The engine failed as a result of a combination of dirt lodging in the fuel pump orifice and a low pump pressure.

Other:
-Nil-

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PIPER PA-28-140 C-FWOJ
AMHERST, NOVA SCOTIA
20 JULY 1985

REPORT NUMBER: 85-A50021 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1605 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	320	150
LAST 90 DAYS	40	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot, with three passengers on board, had returned to the private airstrip for a landing, after a local recreational flight. There had been periods of heavy rain recently, and the 2,000-foot grass airstrip was very wet. The aircraft was high on final approach, and the airspeed was 80 to 85 mph. The aircraft touched down just past the half-way mark of the airstrip. The pilot applied brakes but was not able to stop the aircraft before it overran the airstrip and came to rest in bushes at the end of the runway.

The pilot flew a high approach at a higher than normal airspeed and, as a result, landed the aircraft half-way down the runway. Braking was ineffective on the wet, slippery grass, and the pilot was unable to stop the aircraft before it overran the airstrip.

FINDINGS:

Cause Related:

1. The pilot misjudged the approach and landed at a point on the runway which did not provide adequate stopping distance.
2. Braking was ineffective due to the wet, slippery grass.

Other:

- Nil -

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AIR CADET LEAGUE
BELLANCA C-GQNO
ST-HONORE, QUEBEC
27 JULY 1985

REPORT NUMBER: 85-Q50040 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1610 EDT
OPERATION: Specialty Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	479	55
LAST 90 DAYS	130	45

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

On returning from a glider tow, the pilot decided to land on grass adjacent to the paved runway. During the flare, the aircraft suddenly banked to the right, and the right wing touched the ground. When the pilot attempted to regain control and climb, the left wing struck the ground, and the left main gear was torn loose. The aircraft then nosed over before coming to rest on its left side.

The pilot had learned the three-point-landing technique during training on this type of aircraft. This technique consists of increasing the angle of attack as the wheels skim the runway, so that the aircraft lands in a near-stall attitude. The tail wheel and main wheels then touch down simultaneously. At the time of landing, the wind was gusting, and this resulted in 20-degree variations on either side of the runway and 5- to 10-knot wind-speed variations. When the right wing dropped, the pilot attempted to straighten the aircraft with the ailerons.

A gust of wind caused the right wing to drop as the aircraft was rounding out. As it was already close to a stall, the downward movement of the right aileron caused the right wing to stall. The aircraft did not react as the pilot expected; the right wing dropped lower and touched the ground. The collision of the right wing with the ground and the increased drag on the right side made the aircraft pivot to the right, and a left slide began. The left main gear was then subjected to a lateral stress sufficient to tear it loose.

FINDINGS:

Cause Related:

1. A gust of wind caused the right wing to drop as the aircraft was rounding out.
2. By moving the stick to the left, the pilot increased the sink of the right wing, and it struck the ground.
3. Because of the collision of the right wing with the ground and the increased drag on the right side, the aircraft pivoted to the right and then slid to the left; the left main gear failed when it was subjected to a severe lateral stress.

Other:

-Nil-

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CESSNA 150E C-FRQX
HILL SPRING, ALBERTA 6 mi SW
05 AUGUST 1985

REPORT NUMBER: 85-W50037 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1030 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	100	60
LAST 90 DAYS	7	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The light aircraft had taken off for a circuit from a grass airstrip situated at 4,100 feet. The temperature was 25 degrees Celsius, and the approach was flown with full

flaps at an airspeed of 70 knots. On short final, the passenger, who was also a pilot, advised the pilot that they were well to the right of the strip. The pilot then attempted to go around by applying full power, but she left the flaps at 40 degrees. The aircraft continued to descend, and it touched down 75 feet to the right of the strip. Almost immediately after touchdown, the nosewheel struck a mound of earth from a gopher hole and folded back. The nose dug in, and the aircraft nosed over.

The computed density altitude for the time of the occurrence was approximately 6,000 feet. The pilot's operating handbook states that "the use of 10 flaps is reserved for minimum ground runs or for take-off from soft or rough fields". However "in a high altitude take-off in hot weather ... climb would be marginal with flaps 10". A greater flap deflection would create more drag and would have an even greater adverse effect on climb performance. The handbook also states that, in case of a baulked landing, the flaps "should be reduced to 20" immediately after full power is applied" and then "slowly retracted to the full-up position" when a safe airspeed is reached. According to the handbook, a safe airspeed for climb and after a baulked landing is 55 knots. In this occurrence, the pilot used 70 knots for the go-around and did not retract the flaps from their 40-degree position after full power was applied.

The airstrip lacks any form of markers; it is recognizable from the rest of the surrounding field only by the grass that is compacted along its length. Throughout the rest of the field, the grass is not compacted and numerous holes provide a hazard to aircraft attempting to land off the runway. The pilot had never flown from a grass strip and lacked the experience required to quickly identify the location of the strip on the approach. She also had limited experience operating at high density altitudes. The pilot did not recognize a hazardous situation developing when the aircraft was about to land beside the airstrip. Once she had decided to go around, the pilot did not raise the flaps immediately and climb at the recommended airspeed.

FINDINGS:

Cause Related:

1. Because the pilot had limited experience operating from a grass airstrip, she had difficulty recognizing and lining up with the runway.
2. When a go-around became necessary, the pilot did not use the recommended overshoot procedure; as a result, the aircraft continued to descend and touched down in an unsuitable landing area.

Other:

-Nil-

→ → → → →

CESSNA 180 N33410
PEMBROKE AIRPORT, ONTARIO
12 AUGUST 1985

REPORT NUMBER: 85-O50903 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1315 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	170	55
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

SUMMARY REPORT:

The pilot and his family were on a visual flight rules (VFR) cross-country flight. After a successful touchdown at the destination airport, the aircraft began to veer to the left of the runway. The pilot attempted to correct with brake and rudder but found this to be ineffective. The left wheel went off the left side of the runway into soft sand, and the aircraft ground looped. The right wing and stabilizer were substantially damaged.

When the pilot's right brake pedal was tested, it was found to be inoperative. The brake piston had reached the end of its travel. The brake pads were heavily worn, and the brake discs were corroded. Although the aircraft had flown only a total of 32.5 hours since its last inspection, 19 of those hours were spent flying circuits.

FINDINGS:

Cause Related:

1. The right brake assembly was unserviceable, and, as a result, directional control could not be maintained on the runway.

Other:

- Nil -

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PIPER PA-22-150 CF-MGY
BARRY'S BAY/MADAWASKA VALLEY AIRPARK,
ONTARIO
17 AUGUST 1985

REPORT NUMBER: 85-O/50063 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0925 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	115	5
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

Following lift-off from a 2,400-foot sand and turf runway, the aircraft started to decelerate. The pilot lowered the nose, and the aircraft settled back on the runway at about the half-way point. The pilot rejected the take-off and applied the hand-operated brake. As the aircraft neared the end of the runway, the pilot intentionally ground looped the aircraft to avoid overrunning an area of tree stumps and slash. The right wing struck the ground, and the aircraft nosed over, just in the overrun area.

There were no reported pre-accident failures or malfunctions, and the engine was operating normally. There were scattered clouds in the area, the temperature was 15 to 18 degrees Celsius, and the wind was calm.

The investigation did not determine why the aircraft failed to accelerate normally; however, it may have been due to taking off at too low an airspeed or overrotating on take-off.

During brake application, the pilot felt that the brakes were ineffective. Examination of the brake system revealed that the brakes were inoperative; however, they had worked during the engine run-up. The fluid level in the master cylinder was low, although no leaks could be found, and there was some distortion of the brake cylinder diaphragm. The combination of the low fluid level and the distortion of the diaphragm probably caused the brake failure. The brakes had been worked on at an aircraft time of 1,309.6 hours. The accident occurred at an aircraft time of 1,318 hours.

FINDINGS:

Cause Related:

1. Immediately following take-off, the aircraft decelerated for undetermined reasons.
2. The brakes did not operate due to a combination of a low fluid level and distortion of the master brake cylinder diaphragm.
3. The pilot intentionally ground looped the aircraft to avoid obstructions.

Other:

-Nil-

→ → → → →

BELLANCA 7AC CHAMP CF-WNL
LACHUTE AIRPORT, QUEBEC
03 SEPTEMBER 1985

REPORT NUMBER: 85-Q50053 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1235 EDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,300	250
LAST 90 DAYS	120	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The student pilot and his instructor were returning from a local flight to do some circuits on runway 10. After the first touch-and-go, as the aircraft was climbing through 300 feet, the engine misfired several times. The instructor took over the controls and turned to join the left-hand downwind leg. During the turn, the engine lost all power. The instructor then increased the angle of bank in order to return directly to the airport. The aircraft struck some trees before landing in a clearing adjacent to the airport.

Inspection of the engine revealed no signs of a fault or mechanical failure.

The approach preceding the touch-and-go was at reduced power. Before starting this approach, the student pilot had checked the operation of the carburettor

Aviation Occurrence Reports

heat and had then reset it to the COLD position. The ambient temperature was 12 degrees Celsius, and the dew point was 10 degrees Celsius. Visibility was 10 miles in light showers. The relative humidity was almost 100 per cent. Transport Canada's Aeronautical Information Publication (AIP) Canada indicates that such high relative humidity at that temperature is conducive to severe carburettor icing, affecting the engine at all power levels.

Because of the weather conditions and because the approach was made at low power with the carburettor heat in the COLD position, carburettor icing occurred and caused the engine stoppage. As the engine stopped at low altitude over an undeveloped area, the instructor had to land in a clearing.

FINDINGS:

Cause Related:

1. The engine lost power as a result of carburettor icing.
2. Because the engine stoppage occurred at low altitude over an undeveloped area, the instructor had to land in a clearing.

Other:

-Nil-

→ → → → →

BOEING A75N1 STEARMAN C-GCEH
BERWICK, NOVA SCOTIA
08 SEPTEMBER 1985

REPORT NUMBER: 85-A50025 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,100	100
LAST 90 DAYS	80	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was taking off from his private grass strip on a local flight. While the aircraft was in a climbing right turn at 150 feet above ground level, the engine (Con-

tinental W670-6N) stopped. The aircraft descended rapidly and crashed next to an adjacent runway in a nose-down attitude. The aircraft came to rest in an inverted position.

During the investigation, no mechanical defects were found which could have caused the engine to stop. The fuel selector was found in a mid-travel position, slightly less than half-way between off and on. In this position, fuel could not have flowed through the fuel shut-off valve. The engine would run normally at take-off power for 12 to 15 seconds with the fuel selector turned off.

The cause of the total loss of power was undetermined. The fuel selector in the Stearman may have been inadvertently placed in the mid-travel position as part of the pre-take-off check or may have been struck by one of the occupant on exiting the aircraft after the occurrence. Because of the low altitude at which the engine stopped, there was insufficient altitude to establish a normal glide and carry out a successful forced landing.

The following laboratory and engineering reports were completed: LP 208/85 - Fuel Sample Analysis; A50025-T1 - Technical Findings; and A50025-T2 - Carburettor Examination.

FINDINGS:

Cause Related:

1. The engine lost total power for undetermined reasons during the climb-out.
2. There was insufficient altitude to establish a glide and carry out a successful forced landing.

Other:

-Nil-

→ → → → →

CESSNA 172H C-FQLJ
BANFF, ALBERTA
23 SEPTEMBER 1985

REPORT NUMBER: 85-W50051 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1745 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	235	180
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot, with three passengers, departed Springbank Airport, in a rented aircraft to take pictures around Kananaskis with a stop at Banff. While taxiing for take-off, after a short stop at Banff, the pilot noted that the wind sock at the end of runway 36 was favouring that runway. In preparation for the take-off, he checked controls and selected 20 degrees of flap. Shortly after lift-off, the aircraft drifted to the left. The pilot realized the aircraft was not climbing, and he pulled the nose up in an attempt to climb over some trees. The stall warning sounded, and, seconds later, the wings struck two spruce trees. The aircraft continued another 258 feet over a building and nosed into a sheltered barbecue pit. The aircraft remained on the roof of the shelter, and the occupants evacuated the cabin.

The Banff airstrip, which is 4,583 feet above sea level (asl), is noted for gusty cross-wind conditions. The wind at the time of the accident was from the west at 15 to 20 knots. The aircraft was near maximum gross weight. With these conditions, take-off performance would have been marginal. The low-time pilot had been advised by two experienced pilots not to attempt a landing at Banff under these conditions. The Canada Flight Supplement warns that at Banff moderate to severe subsidence, turbulence, and wind shear may be encountered.

Section 2-11 of the owner's flight manual states that if 10 degrees of flap is used for take-off, the best climb speed is 65 miles per hour until obstacles are cleared. At high altitude where climb is marginal, it is recommended that no flaps be used.

The pilot encountered subsidence and turbulence after lift-off, and, with the existing performance penalties, he was unable to attain sufficient airspeed to maintain a

climb. When he pulled the nose higher in an attempt to climb and avoid the trees, the aircraft stalled and descended into the trees.

FINDINGS:

Cause Related:

1. The pilot elected to take off with an incorrect flap setting.

Other:

-Nil-

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AERONCA 15C SEDAN CF-CLK
VANDERHOOF, BRITISH COLUMBIA
28 SEPTEMBER 1985

REPORT NUMBER: 85-P50046 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1845 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	160	40
LAST 90 DAYS	15	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was waiting for the refueller to arrive to refuel his aircraft. When the refueller did not show up, the pilot decided to take the aircraft up for one circuit. He took off from the midpoint of the runway, and, at an altitude of approximately 200 to 300 feet above ground, the aircraft lost power. A left turn was made in an attempt to return to the button of the runway; however, incipient stalling was experienced, so the pilot recovered straight ahead and landed in a treed area.

At take-off, there were six to seven gallons of fuel on board, which according to the pilot was a sufficient amount for one circuit. The power loss was probably due to interruption of the fuel supply which was caused by acceleration and the aircraft's nose-high altitude after take-off.

Aviation Occurrence Reports

Although sufficient runway to land safely remained ahead, the pilot elected to return to the button of the runway at the time of the power interruption.

FINDINGS:

Cause Related:

1. The engine lost power for undetermined reasons.
2. The pilot attempted to return to the button of the runway instead of landing straight ahead and, as a result, stalled the aircraft.

Other:

-Nil-

→ → → → →

CESSNA 180A CF-KPQ
BALLARAT CREEK AIRSTRIP, YUKON
TERRITORY
03 OCTOBER 1985

REPORT NUMBER: 85-W50054 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1250 PDT
OPERATION: Private Business
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,700	100
LAST 90 DAYS	100	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot, accompanied by a passenger, departed from Ballarat Creek strip on a day visual flight rules (VFR) flight to Dawson City, Yukon. Deteriorating weather conditions were encountered 10 minutes after take-off, and the pilot decided to return to the departure strip. As the aircraft was descending to approach the strip, the engine (Continental O-470-K) suddenly lost power. The pilot pulled the nose up, and the engine regained power briefly, then stopped. The aircraft passed over the west end of the Ballarat Creek strip at 400 feet above ground level (agl) and entered the downwind leg of a left base on runway 26. The pilot applied 20 degrees of flap on approach, but it became apparent that the aircraft had insufficient height to complete the circuit. The pilot turned steeply left toward the runway while applying full flap;

the aircraft descended into trees, then struck the ground in a left-wing-low, nose-down attitude, resulting in substantial damage.

When the aircraft departed for Dawson City, a distance of 75 miles, the fuel quantity gauges were both indicating one-quarter or less. This region of the fuel gauge is marked with a red arc.

When the aircraft was examined, 4.5 U.S. gallons were drained from the left fuel tank, and approximately three U.S. gallons were estimated to be in the right tank. The engine was removed and, when run in a test cell, met all performance criteria.

The pilot operating handbook states "Do not take-off if the pointer is in the red arc". The handbook further indicates that 3.5 U.S. gallons per tank are unusable when the aircraft is not in level flight. This is in addition to the 1.5 U.S. gallons per tank of unusable fuel. Therefore, when the aircraft is not in level flight, a total of 10 U.S. gallons is unusable. The reason for this large amount of unusable fuel is due to the use of single outlet fuel tanks. (Later model aircraft incorporate dual outlet tanks which allow a greater quantity of otherwise unusable fuel to be used).

Calculations indicated that the fuel required for the intended flight would have been a minimum of 17.5 U.S. gallons (including unusable fuel).

Had the pilot used half the flap applied, the final turn to the airstrip would have been gentler and afforded a safer approach configuration.

Neither the condition of the aircraft nor environmental conditions contributed to the accident.

On departure, there was insufficient usable fuel on board to allow the aircraft to reach the intended destination. When the pilot descended toward the airport, the fuel flow at the fuel tank outlet was interrupted because of the location of the fuel tank outlet; as a result, the engine lost power.

The pilot misjudged his forced approach to the airport, overflying the most suitable runway.

FINDINGS:

Cause Related:

1. The pilot departed with insufficient fuel to complete the intended flight.
2. The engine lost power due to fuel starvation.
3. The pilot misjudged his forced approach.

Other:
-Nil-

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FAIRCHILD F27F FRIEND-SHIP C-FIOG
PEACE RIVER, ALBERTA
30 OCTOBER 1985

REPORT NUMBER: 85-W54110 (Incident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 0935 MST
OPERATION: Private Company Business
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	13,500	3,000	13,000	900
LAST 90 DAYS	200	100	90	45

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	26

SUMMARY REPORT:

The aircraft was on an instrument flight rules (IFR) flight from Whitecourt to Peace River, Alberta, and the crew flew a very high frequency omnidirectional range (VOR) approach to runway 03. The aircraft descended to minima; however, the crew did not clearly see the runway. They overshoot, circled inside the VOR, and again approached to runway 03. The runway was seen when the aircraft was on final; the co-pilot, flying from the left seat, reduced power, descended at 95 knots, and the aircraft touched down approximately one-third of the way down the runway. The crew was unable to stop the aircraft on the runway, and it slid off the end at about 20 knots. The aircraft stopped in soft ground approximately 100 feet from the end of the runway.

The asphalt runway is 5,000 feet long and was covered with wet snow. The weather at the time was reported as sky partially obscured, ceiling 1,200 feet overcast, with the visibility one to one and one-half miles in light snow. The wind was from 190 degrees at three knots. The landing minima for the approach flown are 400-foot ceiling and one-mile visibility.

The pilot reported that the runway had not been ploughed and was not distinguishable from the rest of the snow-covered field. The delay in ploughing the runway was due to the heavy traffic flow prior to the occur-

rence. There was some difficulty in immediately selecting ground fine pitch on the propellers, probably because the aircraft weight was initially not sufficiently on the wheels to activate the safety switch. The braking action, as measured just after the incident, was poor to nil.

The aircraft was landed long because the crew had difficulty in clearly seeing the runway environment in time to position the aircraft properly for a landing. Once landed, the aircraft could not be stopped on the runway because of the short distance remaining and the poor braking action.

FINDINGS:

Cause Related:

1. Because of the reduced visibility and low runway contrast, the crew was not able to position the aircraft properly for a safe landing.
2. The aircraft overran the runway because it was landed long, and the braking action was poor.
3. The runway had not been ploughed prior to the landing.

Other:
-Nil-

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CESSNA 172N C-GQDI
VALIQUETTE LAKE, QUÉBEC
08 NOVEMBER 1985

REPORT NUMBER: 85-Q50066 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1754 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	251	231
LAST 90 DAYS	53	53

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	2	-

HISTORY OF THE FLIGHT:

The aircraft departed Nemiscau, Québec, at 1744 on a night visual flight rules (VFR) flight to Chibougamau, Québec. After becoming airborne, the aircraft entered a

Aviation Occurrence Reports

cloud layer at 1,000 feet above ground level (agl) and climbed to 2,500 feet above sea level (asl). At this altitude, the aircraft was in and out of cloud, and the pilot lost control of the aircraft. He regained control and informed Nemiscau Airport that he was having problems and that he was returning to the airport. Shortly thereafter, the pilot again lost control of the aircraft, and, while in a descending turn, the aircraft struck some trees. The pilot and passengers were seriously injured.

PERTINENT INFORMATION:

When the pilot arrived at the airport around 1515, he checked the weather sequences but did not obtain a weather briefing. He checked the sequences again later and filed a VFR flight plan, direct to Chibougamau at an altitude of 2,500 feet asl.

The Nemiscau 1700 weather observation was sky partially obscured, ceiling estimated 1,000 feet broken, 2,500 feet overcast, and visibility three miles in light snow and fog. The weather at destination was VFR. Even though he was proceeding on a VFR flight, the pilot indicated that he intended to fly through the first layer of cloud, then proceed between layers. He expected to be clear of clouds shortly after leaving Nemiscau. The Nemiscau airport elevation is 804 feet asl. All applicable navigation aids were functioning normally.

The pilot had a total of 42 hours night flying and four hours simulated instrument flight. He did not have any actual instrument flying experience, and his licence was not endorsed for instrument flight.

Before taking off, the pilot had received confirmation from the passengers that their seat belts were fastened. However, the passenger in the rear seat had not been able to fasten her seat-belt and, instead, had wrapped it around herself; she was thrown out of the aircraft on impact. There were no shoulder harnesses on board the aircraft, and the front-seat occupants were projected forward against the control columns and instrument panel.

ANALYSIS:

The weather at Nemiscau was marginal VFR. Although the pilot checked the weather sequences prior to flight, he did not obtain a weather briefing before take-off. He intended to fly between cloud layers on a dark night, even though he did not have an instrument flight rules (IFR) endorsement. When he entered clouds, he became disoriented and lost control of the aircraft.

The passenger whose seat-belt was not fastened was thrown out of the aircraft and suffered serious injuries. As the cabin was relatively intact, her injuries may have

been reduced had she been properly secured. In addition, shoulder harnesses would most likely have reduced the degree of injury to the front-seat occupants.

FINDINGS:

Cause Related:

1. When the pilot, who did not have an IFR endorsement, attempted a flight in below VFR weather conditions, he became disoriented and lost control of the aircraft.

2. When the pilot lost control of the aircraft, the aircraft entered a descending turn and struck the trees.

3. The rear-seat passenger did not have her seat-belt fastened and, as a result, was thrown from the aircraft on impact and seriously injured.

Other:

1. If shoulder harnesses had been installed in the aircraft and worn by the front-seat occupants, their injuries would have been reduced.

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CESSNA 207 SKYWAGON C-GOWY
CHIPEWYAN LAKES, ALBERTA
08 NOVEMBER 1985

REPORT NUMBER: 85-W50061 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1520 MST
OPERATION: Private Ferry
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,600	320
LAST 90 DAYS	35	35

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

While in cruise flight over a desolate, snow-covered northern area, the pilot observed a decrease in engine rpm followed by a sudden stoppage of the propeller. Attempts to restart the engine were unsuccessful, and a forced landing was carried out on a narrow cut line bordered by trees. The aircraft struck trees on the approach path, and the left wing dug into the partially frozen muskeg on touchdown, resulting in substantial damage.

Inspection of the engine (Continental 10-520F) indicated that the crankshaft had fractured. Examination of the crankshaft by the CASB Engineering Laboratory determined that the failure was a result of a fatigue crack which appeared to originate at a subsurface defect or inclusion. The problem of inclusions (which originate during fabrication) had been addressed by the engine manufacturer's issue of Service Bulletin M-81-1 (REV I), June 1981. This bulletin requires that a specific ultrasonic inspection be conducted on the crankshaft at overhaul. This engine, which had been overhauled less than 400 hours prior to the accident, had been certified as having its crankshaft ultrasonically inspected. However, it could not be determined if the ultrasonic inspection had been conducted in accordance with the requirements of the bulletin, as the engine overhaul firm had gone out of business.

The following laboratory report was completed: LP 21/86 - Examination of Crankshaft.

FINDINGS:

Cause Related:

1. An engine failure while in cruise flight necessitated a forced landing which resulted in substantial damage.
2. The engine failure was caused by a crankshaft fracture that originated from a subsurface defect (inclusion).

Other:

-Nil-

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CESSNA T206C N4848F
VANDERHOOF, BRITISH COLUMBIA
20 NOVEMBER 1985

REPORT NUMBER: 85-P50907 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1830 PST
OPERATION: Private Other
DAMAGE: Destroyed
PILOT LICENCE: Private (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,600	400
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	1	-

HISTORY OF THE FLIGHT:

During a night flight from Prince Rupert to Prince George, the pilot made a refuelling stop at Smithers, where a total of 69 litres of fuel was added to the right tank. One hour and eight minutes after take-off, while cruising at 3000 feet above ground level (agl) over Vanderhoof, the aircraft's engine (Continental TS10 520) stopped and could not be restarted. An unlit highway to the west of the town was selected as an emergency landing strip. On final approach in the dark, the left wing struck a tree-top, and the pilot was unable to maintain control. The aircraft came to rest with a power pole embedded in the rear-seat area. Neither door would open; the pilot escaped through the side window, and the passenger had to be rescued through the windshield.

PERTINENT INFORMATION:

The refuelling operation in Smithers was completed in darkness and was terminated when the tank sounded full. A total of 69 litres (15.18 Imperial gallons) had been added to the right tank. The tank was not visually checked; however, the pilot indicated that the fuel gauge read full. The left tank, unused during the flight from Prince Rupert to Smithers, was full.

Normal fuel consumption for a Cessna 206 is approximately 15 gallons per hour. The 1 hour and 20 minute flight to Smithers should have used 20 gallons. Full tank capacity on this aircraft is 25 Imperial gallons per wing tank for a total of 50 gallons.

When the engine stopped, one hour and eight minutes after take off, the pilot immediately selected the full left fuel tank and attempted a restart. The aircraft check-list followed by the pilot indicated that the auxiliary fuel

Aviation Occurrence Reports

pump should be placed in the HI position for five seconds and then turned off. A Cessna owner advisory, SE79-25A, recommends that, for an in-flight engine restart, the auxiliary fuel pump be selected to the HI position until fuel flow has stabilized or is in the green arc. The pilot did not remember this advisory and, consequently, was unable to restart the engine.

The right wing tank was found to be empty and five of the eight tank clips that support the top of the right fuel bladder, were not attached. It could not be determined when or why the bladder clips were unattached. A Cessna Service Information letter issued on 03 February 1984 called for the inspection of the fuel cells to ensure that the fuel cell clips were properly fastened. Cessna recommended compliance with this letter within the next 100-hour or annual inspection, or sooner if the aircraft had been either in storage or in a high moisture climate. It could not be determined if this inspection had been carried out.

The right fuel transmitter unit was removed for inspection. The upper float stop was bent, thus allowing the float arm more than normal travel. The sliding rheostat operated by the tank float assembly was found repositioned over top of the gauge coil. The rheostat arm was worn where it contacted the top of the gauge coil. The grounding wire was improperly positioned under the fuel gauge seal and made only tentative contact with a gauge bolt. Ammeter tests revealed that the cockpit fuel gauge indicated full when the rheostat arm made firm contact with the top of the gauge coil. Readings were, however, very intermittent when the rheostat arm was moved over the gauge coil by the tank float assembly.

The rubber tubing connecting the right tank and right fuel line was found to be in a deteriorated condition. It was cracked and tore easily. It could not be determined if this tube leaked.

The right wing underside showed evidence of fuel seepage. The paint on the underside of the wing and flap was stained; the top of the right wing and the fuselage were unstained.

ANALYSIS:

The flight into Smithers should have consumed 20 Imperial gallons, leaving a residual of 5 gallons if the tank had in fact been full when the aircraft took off from Prince Rupert. Therefore, when the aircraft departed Smithers, there would have been a maximum of 20 gallons in the right wing tank. If 20 gallons were in the tank, and, at 15 gallons per hour fuel consumption, the fuel in the right tank would have been depleted 1 hour and 20 minutes after take-off. The fact that the right tank fuel was exhausted one hour and eight minutes

after take-off indicates that the right tank was not filled to capacity when refuelling was terminated.

The unattached right tank top clips allowed the top of the tank to collapse thus reducing tank volume. This collapsed condition eliminated all air from the tank and produced aural indications similar to that of a full tank even though fuel volume was considerably less than tank capacity. This aural indication induced the refueller to cease the refuelling operation.

The stain on the underside of the wing indicates that there was probably long-term seepage from tank fittings. The amount of fuel that had leaked from the fuel system could not be determined.

The right fuel tank transmitter unit provided intermittent erroneous readings. The bent upper float stop allowed the rheostat arm to reposition itself over the gauge coil. Firm contact between the rheostat arm and coil produced a full indication regardless of tank content while the intermittent contact produced erroneous readings.

The aircraft engine stopped because of fuel starvation. Air introduced into the fuel lines when the right tank went dry had to be purged before the engine could be started. This procedure requires that the auxiliary fuel pump be selected to the HI position until fuel flow is indicated. The five seconds of auxiliary pump usage did not accomplish purging and thus the engine did not restart, even though the left tank was selected and contained sufficient fuel.

During the forced landing, the pilot was unable to clearly see the landing area, and the aircraft struck a tree, causing the pilot to lose control.

FINDINGS:

Cause Related:

1. The right fuel tank collapsed because five of the tank support clips were unattached.
2. The collapsed right tank, with resulting reduced tank volume, caused the refueller to believe the tank was full to normal capacity.
3. The fuel in the partially filled right fuel tank was exhausted in flight, resulting in engine stoppage.
4. The check-list used by the pilot did not contain the correct information regarding auxiliary fuel pump usage.
5. The right fuel tank transmitter unit produced intermittent erroneous fuel quantity indications.

6. Because of the darkness, the pilot could not clearly see the landing area, and the aircraft struck a tree during the forced landing.

Other:

1. The rubber tubing connecting the right wing tank to the fuel line was found to be in a deteriorated condition.

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CESSNA 140 CF-EEO
ST-ANDRE-AVELLIN AIRPORT, QUEBEC
24 NOVEMBER 1985

REPORT NUMBER: 85-Q50068 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1400 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,800	30
LAST 90 DAYS	35	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

During the landing roll following a three-point landing, the light aircraft veered to the left. It left the runway after travelling about 200 feet and struck a hard-packed two-foot-high snowbank and nosed over.

Runway 29, used for the landing, is asphalt paved and 3,600 feet long by 75 feet wide; it had been ploughed and was almost completely bare, with good braking action. There was a 20-degree cross-wind blowing from the right at 15 knots, and the ambient temperature was zero degrees Centigrade. There were no visible tire skid marks related to this accident. The aircraft was at or about maximum gross weight, and the centre of gravity was at or about the aft limit. The aircraft had last taken off from a slush-covered runway.

The pilot reported that the left wheel jammed; however, examination of the left wheel and brake assembly failed to reveal any mechanical malfunction. Restriction to the free wheel rotation was caused by hard-packed snow, which had penetrated inside the wheel when it struck the snowbank and which was butting against the brake casing. In addition, a substantial amount of pitting was noted on the left wheel brake disk which would have, had the pilot applied left brake, caused abnormal brak-

ing action on the left. As the aircraft veered off during a ground roll in excess of 200 feet, it is unlikely that the wheel was jammed as a result of frozen slush accumulation during the previous take-off.

It could not be determined why the pilot lost control of the aircraft during the landing roll.

FINDINGS:

Cause Related:

1. During landing, directional control of the aircraft was lost for undetermined reasons.

Other:

-Nil-

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CESSNA 172L N25117
GREENWOOD AIRPORT, NOVA SCOTIA
03 DECEMBER 1985

REPORT NUMBER: 85-A50902 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1855 AST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	698	690
LAST 90 DAYS	27	27

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was on a flight from Halifax, Nova Scotia to Bangor, Maine and decided to stop for fuel at Greenwood, Nova Scotia. He refuelled the aircraft and was taxiing out to runway 31 for take-off, when the right wing lifted, and the aircraft became airborne. The pilot attempted to hold the aircraft level but was unsuccessful, and the nose dropped rapidly. The aircraft came to rest in an inverted position. The weather report issued 10 minutes after the accident indicated that the wind was 290 degrees magnetic at 35 knots gusting to 49 knots.

The pilot elected to taxi the aircraft in wind conditions which were too strong for the safe operation of the aircraft. During the taxi, the aircraft encountered a

Aviation Occurrence Reports

strong gust of wind which caused it to flip over onto its back.

FINDINGS:

Cause Related:

1. The pilot elected to taxi in wind conditions which were too strong for the safe operation of the aircraft.
2. During the taxi, a strong gust of wind flipped the aircraft onto its back.

Other:

-Nil-

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BEECHCRAFT 35C33A DEBONAIR C-FULB
MONT SHEFFORD, QUEBEC
06 DECEMBER 1985

REPORT NUMBER: 85-Q50070 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1655 EST
OPERATION: Private Ferry
DAMAGE: Destroyed
LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	530	42
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The pilot was on a visual flight rules (VFR) night flight between his private runway at Saint-Sébastien, Quebec and the Bromont, Airport, Quebec, where he was to store his aircraft for the winter. About 10 minutes after take-off, the pilot communicated with the Bromont Airport for the necessary landing information. A few moments later, a witness on the southern slope of Mont Shefford, about 10 miles northeast of the Bromont Airport, heard the engine noise and saw the navigation lights of an aircraft heading east. A few moments later, he heard a crash and notified the local authorities. No ELT signal was picked up. Three hours later, Search and Rescue (SAR) located the wreck on the southeastern slope, 200 feet from the top of Mont Shefford. The pilot was killed.

PERTINENT INFORMATION:

At the time of the accident, runway 05 was in use at Bromont. The weather conditions were scattered clouds 2,500 feet above ground level (agl), with a ceiling of 8,000 feet agl, and a visibility of 15 miles in intermittent light snow flurries. The winds were from 060 degrees magnetic at 10 knots. Two policemen, who were patrolling in the area, stated that the night was dark and that they had not made out the aircraft but only the beam of light directed downward and in the opposite direction.

The top of Mont Shefford is 1,715 feet above sea level (asl) and 1,350 feet above the Bromont runway. The top was 800 feet below the cloud layer. On the southeastern slope of the mountain, visual cues are non-existent.

Examination of the wreckage revealed that the aircraft struck the ground, on a northwesterly heading, with the wings level, and in a nose-down attitude of about 20 to 25 degrees. There was no evidence to indicate that the aircraft had broken up in flight. The landing gear had retracted on impact. Examination of the propeller indicated that the engine was running and turning at high rpm. The damage to the aircraft and the scattered wreckage indicated high speed on impact. The ELT was found intact with the switch on the OFF position.

The pilot had the necessary qualifications for night flying and knew the area. He was not wearing his seat-belt. The crash was non-survivable due to the impact forces. The pilot was thrown about 40 feet beyond the cabin wreckage. The autopsy revealed that the pilot was not suffering from any physical disability. The pilot might have inadvertently encountered instrument flight conditions.

ANALYSIS:

It was impossible to determine the cause of the accident. It is possible that the pilot lost control of the aircraft because of disorientation due to the dark night, the overcast sky, and the absence of visual cues.

FINDINGS:

Cause Related:

1. The aircraft crashed into the mountain for undetermined reasons.

Other:

1. The pilot had not buckled his seat-belt.
2. The ELT was not armed at the time of the accident.

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TAYLORCRAFT BC12D C-FSWX
EAST SHORE LAKE WINNIPEG, MANITOBA
07 DECEMBER 1985

BRIEF NUMBER: 85-C50094 (Accident)
LOCAL TIME: 0930 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	250	100
LAST 90 DAYS	6	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot and passenger departed in the aircraft on a pleasure flight along the east shore of Lake Winnipeg under visual flight rules (VFR) weather conditions. Thirty minutes after departure they encountered snow showers and decided to land on the frozen lake. Just prior to touchdown, the aircraft stalled and landed hard, and the landing gear failed.

The pilot's licence validation certificate was not valid.

The pilot had lost visual reference with the shoreline of the lake during the approach to land. He speculated that he had been distracted by the whiteout condition and had failed to maintain adequate airspeed.

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CESSNA 182 C-FDMI
OLDS, ALBERTA
07 DECEMBER 1985

REPORT NUMBER: 85-W50069 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1930 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,300	1,230
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was practising night circuits under visual flight rules (VFR) conditions. On the first circuit, the pilot noticed some ground fog beginning to develop, but he completed the landing without incident. Visibility was good throughout the second circuit until just prior to touchdown, at which time the pilot momentarily lost sight of the runway lights. Directional control was lost, and the aircraft collided with a snowbank to the right of the runway and nosed over.

The Olds Airport has no weather reporting station, but pilot reports for the area confirm that a thin layer of ground fog had formed in the vicinity of the airport.

Because the visibility above the fog-bank was unrestricted, the pilot was surprised when the runway lights became obscured at touchdown. The momentary loss of forward visibility resulted in a loss of directional control. By the time the pilot had regained visual reference, the aircraft had left the runway surface.

The pilot was landing without the use of the aircraft landing lights. Although the use of landing lights is not mandatory, their use in this case could have warned the pilot of the fog layer.

FINDINGS:

Cause Related:

1. The pilot lost sight of the runway lights because of ground fog and, as a result, lost directional control of the aircraft.

Other:

-Nil-

Aviation Occurrence Reports

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CESSNA 150J CF-QNX
PITT MEADOWS, BRITISH COLUMBIA
08 DECEMBER 1985

REPORT NUMBER: 85-P50054 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1453 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	298	97
LAST 90 DAYS	0	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The aircraft had taken off and was approximately 200 feet above ground level when a power loss occurred. The aircraft, which remained in a nose-up attitude, stalled and struck the ground in a nose-down, left-wing-low attitude, approximately 1,000 feet from the end of the runway. Both occupants were seriously injured.

According to available records, the pilot had not flown the aircraft in the past 140 days. During this time, the aircraft had been parked on the tarmac at the airport, unsheltered, and subjected to the elements. On the pre-flight inspection, the pilot had drained the fuel system with the aid of the sampler cup at the wing tanks and onto the ground from the gascolator drain.

The aircraft's fuel system was examined in detail. A fuel sample from the left wing tank contained no water, but the sample from the right wing tank and the fuel line leading to the gascolator had significant water contamination. The gascolator was found three-quarters full of ice; the aircraft had been subjected to subzero temperatures in the 16 hours immediately following the occurrence. The carburettor also had ice in its bowl. A chunk of ice was found in the right wing fuel tank when the tank was removed from the wing; the ice in a liquid state amounted to more than two quarts of water. Both tank filler necks, which were the recessed type without a wing flap for protection, showed extensive corrosion, and the fuel tank caps were found to be dissimilar in type; the cap on the right tank was loose-fitting.

It was determined that a combination of heavy corrosion of the filler neck on the right wing tank and the loose

tank cap allowed water to enter the tank. Although the pilot had drained the fuel system prior to his flight, there was still sufficient water in the system to cause the power loss.

FINDINGS:

Cause Related:

1. A power loss occurred as a result of water contamination in the fuel system.

2. The aircraft stalled and struck the ground.

3. Heavy corrosion of the filler neck on the right wing tank and the loose tank cap allowed water to enter the fuel system.

Other:

-Nil-

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CESSNA 180H CF-ZOX
MOBIL BISTCHO AIRSTRIP, ALBERTA
16 FEBRUARY 1984

BRIEF NUMBER: 84-W40008
LOCAL TIME: 1700 PST
OPERATION: private business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	187	119
LAST 90 DAYS	34	34

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

REPORTED CIRCUMSTANCES:

The pilot attempted a downwind take-off on an unmaintained strip covered with 10 inches of snow. A plowed winter road had left 2 1/2 foot snowbanks across the runway. The left ski caught the snowbank and the aircraft groundlooped. The pilot could have avoided the bank by using the full strip or by taking off into wind. He said his judgment was affected by fatigue.

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CESSNA A185E C-GLFC
LAC CASTELVEYRE, QUÉBEC
15 MAY 1984

REPORT NUMBER: 84-Q40022 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1030 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	930	30
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

At approximately 700 feet, during the final turn before landing on a lake, the engine speed dropped suddenly to idle and could not be regained. The pilot lowered partial flaps and entered a glide over the ground in order to reach the lake. During the descent, the pilot raised the nose of the aircraft. The aircraft developed a high sink rate and made a very heavy landing on the water in a nose-high, left-wing-low attitude.

The induction air valve shaft (Part Number 0750173-1), which also provides support to the throttle and mixture bellcranks, was found fractured. The air valve regulates engine air intake. Laboratory examination of the fractured part revealed that the shaft failed in fatigue at the rivet hole nearest to the throttle and mixture control bellcranks.

Previous similar failures of identical parts have been observed on other aircraft. The cantilever mounting of the throttle and mixture bellcranks on the shaft end imposes a bending moment at the rivet hole that can initiate fatigue cracks. In this occurrence, the fracture of the air valve shaft caused the engine power to drop to idle.

During the ensuing forced landing, the pilot attempted to stretch the glide by lowering the flaps and raising the nose. As a result, the aircraft mushed, developed a high descent rate, and landed heavily.

The following laboratory report was completed: LP 187/84 - Induction Air Valve Shaft Failure Analysis.

FINDINGS:

Cause Related:

1. The design of the throttle and mixture bellcrank mounting imposed a bending moment which caused fatigue cracking of the induction air valve shaft.
2. The pilot attempted to stretch the glide by lowering the flap and raising the nose of the aircraft; as a result, the aircraft mushed, developed a high sink rate, and landed heavily on the water.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

Transport Canada issued Service Difficulty Advisory No. 86-10 in September 1986, strongly recommending that the owners of Cessna 185, A185, and A188 aircraft with 300 horsepower engines inspect the airbox shafts of their aircraft and, if necessary, replace with an appropriate shaft without rivet holes.

Transport Canada will continue to monitor the serviceability of the shaft through the Service Difficulty Reporting Program.

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CESSNA 180K C-GBQS
LAC GAUTHIER, QUEBEC 3 mi W
21 MAY 1984

REPORT NUMBER: 84-Q40024 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1100 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	315	237
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The float-equipped aircraft had stopped at Lac Legare to pick up a third passenger before continuing toward Montreal. Half an hour after take-off, the aircraft while

Aviation Occurrence Reports

in a stalled attitude struck a number of trees. The left wing was torn off, and the aircraft came to a stop in the forest, on its left side and in a nose-down attitude.

According to the pilot and passengers, the aircraft lost all power as it was descending toward Lac Noir, where the pilot wished to fly over a lakeside cottage owned by an acquaintance. The pilot stated that, after the power loss, the float-equipped aircraft could not glide to any of the nearby lakes, and he decided to make a stalled landing into the trees.

There was no indication of a pre-impact technical malfunction. The engine was bench-tested after the accident, and it performed in accordance with the manufacturer's specifications. The fuel tanks contained sufficient fuel for the planned flight. The sky was clear, visibility was over 25 miles, and there was no risk of icing.

The aircraft's gross weight exceeded the prescribed limit by about 65 pounds, and the centre of gravity was about one inch aft of the rear limit.

The cause of the accident could not be determined.

FINDINGS:

Cause Related:

1. The aircraft crash-landed in the forest for undetermined reasons.

Other:

1. The weight and centre of gravity location exceeded the prescribed limits.

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PIPER PA-12 C-GAQP
LAC MARJO, QUEBEC
21 JULY 1984

REPORT NUMBER: 84-Q40043 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1530 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	143	88
LAST 90 DAYS	65	65

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The aircraft took off toward the north-northwest into a 15- to 20-mph gusting head wind. Immediately after take-off, the pilot initiated an extremely steep climb. A few seconds later, at about 100 feet, the pilot began a very steep left turn; the aircraft then quickly lost altitude and plunged into the lake. On impact, the pilot received a blow to the head. The passenger was saved by fishermen, but the pilot, who was unable to get out of the wreckage, drowned.

PERTINENT INFORMATION:

The investigation did not identify any pre-impact mechanical defect. The weight of the aircraft exceeded the maximum gross take-off weight by about 230 pounds. The centre of gravity was forward of the limit. The stall speed (V_s) for a Piper PA-12 with a weight of 1,838 pounds in a normal attitude is 49 mph. The V_s varies in accordance with the aircraft weight and the pitch. The 230-pound overload would have increased it by about three mph. According to the passenger, the airspeed indicator was at 40 mph during the descent.

The distance available for take-off was ample for this type of aircraft, and there were no major obstacles. To reach his destination, the pilot had to go around a hill on the southwest shore of the lake, about halfway along it, or execute a tight turn.

The pilot had accumulated 65 hours on this aircraft type since obtaining his endorsement about two months earlier. During his training on a float-equipped aircraft, his instructor had, on several occasions, corrected premature climbs after take-off.

It could not be determined whether the pilot was rendered unconscious by the blow to the head.

ANALYSIS:

The pilot climbed quickly at a reduced speed immediately after take-off, probably in order to begin the turn and avoid going around the hill. Because of the overload condition, low speed, and steep pitch angle, the aircraft stalled at low altitude. It plunged into the lake before the pilot had time to regain control.

FINDINGS:

Cause Related:

1. Because of the overload condition, low speed, and steep pitch angle, the aircraft stalled shortly after take-off.
2. The aircraft was too low for the pilot to have time to regain control.

Other:

-Nil-

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CESSNA 175 C-FCMZ
LAC PONTBRIAND, QUEBEC
22 JULY 1984

REPORT NUMBER: 84-Q40046 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1430 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	113	25
LAST 90 DAYS	25	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	2	-

SUMMARY REPORT:

The float-equipped aircraft had just taken off in a westerly direction from a narrow lake and was at about 500 feet when the engine misfired several times. The pilot decreased power, applied carburettor heat, placed the aircraft in a descent attitude, and extended 40 degrees of flaps to land straight ahead on the lake. When the pilot

realized that the aircraft was getting too close to the waterfalls on the cliffs at the end of the lake, he applied full power, and the engine ran normally. At about the same time, the pilot made a steep left turn. While in the turn, the aircraft nosed down and turned in mid-air, then crashed into the lake. The three occupants, who were seriously injured, were rescued by people in a pleasure boat.

The analysis of the damage to the aircraft and the witness statements indicate that the aircraft was in a left-hand spin when it struck the surface of the lake. The pilot stated that he had to do a 180-degree turn to avoid the cliffs at the end of the lake. No pre-accident mechanical defect was found during the investigation. At the time of the accident, the temperature was 27 degrees Celsius, the relative humidity was high, and the winds were light from the west.

The engine misfired several times for undetermined reasons. It is possible that carburettor icing occurred. The pilot was concerned about the misfiring, and he reduced the power to land back on the lake. As he approached the end of the lake and saw the waterfalls, the pilot feared the aircraft would hit the cliffs, so he initiated a 180-degree turn in order to land in the opposite direction. Because of the steepness of the turn, the aircraft stalled and went into a spin; there was insufficient altitude at that point for the pilot to effect a recovery.

FINDINGS:

Cause Related:

1. The pilot was concerned about the misfires which occurred after take-off, so he attempted to land the aircraft straight ahead on the lake.
2. Because he was afraid he would hit the cliffs at the end of the lake, the pilot initiated a steep left-hand turn.

3. The aircraft entered a spin while in the turn.

Other:

-Nil-

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Aviation Occurrence Reports

CESSNA 185D C-FSGU
EDGEWOOD, BRITISH COLUMBIA 10 mi NW
13 AUGUST 1984

REPORT NUMBER: 84-P40044 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1830 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	769	659	110	10
LAST 90 DAYS	40	40	19	9

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	2	-	-
PASSENGERS	2	-	-

SUMMARY REPORT:

The float-equipped aircraft, which was being flown on a cross-country flight from Nelson to Vernon, British Columbia, failed to arrive at destination. An airliner picked up an emergency locator transmitter signal; the subsequent search located the aircraft wreckage in a valley at 5,200 feet above sea level (asl). The aircraft had struck the ground on a southeasterly hearing in a steep, nose-down attitude. On impact with the tree-covered terrain, both wings failed forward, and the fuselage folded over the engine at the firewall. All four occupants were killed.

Through a distance of about 10 miles, the terrain rises from 1,446 feet asl at the entrance to the valley to 5,200 feet asl at the accident site. The terrain north and west of the accident site is higher still, rising to 7,412 feet asl at the highest point. The aircraft's route was up the valley in a northwest direction toward the rising terrain. At the time of the accident, the wind was from the southwest at 14 knots, the sky was clear, the visibility was in excess of 15 miles, and the temperature was 22 degrees Celsius.

The owner of the aircraft was in the right seat, and a less experienced pilot was occupying the left seat. It could not be determined who had been flying the aircraft at the time of the accident. No flight plan had been filed for the flight, and there were no witnesses to the accident. The aircraft engine was operating at 2,100 rpm on impact and appeared to be serviceable.

The flight path of the aircraft into the trees and the damage sustained by the aircraft were both indicative of an aircraft in a spin. It is probable that the pilot at-

tempted to reverse course when it became apparent that the aircraft would not clear the terrain ahead, and, during this turn, the aircraft stalled and entered a spin.

FINDINGS:

Cause Related:

1. The aircraft departed from controlled flight for undetermined reasons while navigating through a mountain valley with rising terrain ahead.

Other:

- Nil -

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HELIO AIRCRAFT CORP. H-391B C-GOTP
SUDBURY, ONTARIO 15 mi S
12 SEPTEMBER 1984

REPORT NUMBER: 84-O/40063 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1930 EDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	450	N/A
LAST 90 DAYS	30	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot took off from Bluff Lake, heading in a southwesterly direction. Shortly after lift-off, the engine reportedly stopped, and the aircraft crashed into trees at the south end of the lake. The aircraft was destroyed by fire.

The take-off run available is about 3,500 feet. To use the entire distance, a heading change of 30 to 35 degrees has to be made to enter a bay 1,200 feet long and 200 feet wide. Tree-covered terrain rises to over 150 feet on each side of the bay, and a small stream flows into the south end of it. The aircraft came to rest near the stream, about 80 feet from the shoreline.

The sky was overcast with the ceiling about 5,000 feet and the visibility about 15 miles. The wind was from 120 degrees at less than five knots.

The aircraft had been maintained in accordance with existing directives, and there was no physical evidence of a pre-crash failure or malfunction. It was estimated that the take-off weight of the aircraft was close to or at the maximum allowable weight of 3,000 pounds; however, the post-crash fire made a precise determination of aircraft weight impossible. The flaps were determined to have been extended three to four degrees. The Flight and Operating instructions of the Aircraft Maintenance Manual states that shorter take-off runs, under standard air, sea-level conditions, are performed with full flaps, although 20-30 degrees will give a better rate of climb once the airplane is airborne and provides better take-off at higher altitudes, or with overload. The emergency locator transmitter (ELT) did not function, as it had not been armed.

The aircraft initially collided with trees 10 feet from the shoreline at 20 to 25 feet above ground. Marks on the trees and aircraft show that the aircraft was in a nose-high attitude and travelled in near level flight for about 50 feet before it started to descend. Two six-inch diameter trees had been cleanly cut through by the propeller, and a 10-inch slash was made in another tree. The reduction gear box was sheared off the engine as the aircraft came to rest.

The propeller cuts on the trees, the flight path of the aircraft after initial contact with the trees, and the sheared reduction gear box all demonstrate that the engine was producing power during the travel through the trees. However, it was not determined why the aircraft struck the trees.

FINDINGS:

Cause Related:

1. The pilot did not utilize the recommended flap setting, and the aircraft struck trees during take-off.

Other:

1. The ELT did not function because it had not been armed.

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CESSNA C180A C-FLXY
LAC MANOUANE, QUEBEC
26 SEPTEMBER 1984

REPORT NUMBER: 84-Q40080 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1445 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	550	450
LAST 90 DAYS	19	19

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft had taken off and was approximately 200 to 300 feet above the ground, when the engine stopped. The pilot attempted to place the carburettor heat control to the "on" position; however, as he made the selection, the control broke off in his hand. The pilot force-landed the aircraft in trees.

There was adequate fuel carried on board, and no mechanical deficiency was found that would have caused the engine stoppage. The carburettor heat system was found in the "off" position. The temperature and dew point at the time of the accident could not be determined exactly; however, they would have been at or close to conditions conducive to serious carburettor icing at any power setting.

The investigation was unable to determine the cause of the engine stoppage; however, with the carburettor heat selected off and given the ambient atmospheric conditions, carburettor ice probably restricted the flow of the gas/air mixture through the carburettor to the extent that all engine power was lost.

The examination of the carburettor heat control revealed that the metal selector cable had fractured three inches from the carburettor attachment point. Microscopic examination revealed a number of longitudinal rub marks along the cable adjacent to the mating fractures. The fractures revealed features that were characteristic of fatigue and consistent with the fatigue progressing to failure under normally applied loads.

The service manual states that the inspection frequency is every 100 hours for this cable and that it has a maximum service life of 1,500 hours. Since microscopic examination was required to view the chafing wear, it

Aviation Occurrence Reports

would not have been observed during a visual inspection of the cable. It is suspected that the cable was original to the aircraft, with a time of 2,750 hours, which is well in excess of the replacement time of 1,500 hours.

The following laboratory report was completed: LP 386/84 - Carburettor Heat Cable.

FINDINGS:

Cause Related:

1. The cause of the engine stoppage could not be determined.

Other:

1. The weather conditions were conducive to carburettor icing.

2. The carburettor heat selector cable failed through the overload extension of fatigue pre-cracks under normally applied loads.

3. The fatigue was initiated as a result of chafing wear.

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CESSNA A185F C-GUIC
BLOUIN LAKE, QUÉBEC
20 OCTOBER 1984

REPORT NUMBER: 84-Q40086 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1445 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	679	185
LAST 90 DAYS	71	71

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	1	-	-

SUMMARY REPORT:

The float plane touched down in strong winds on rough water. Immediately after water contact, the right float struck a partially submerged rock. Suspecting float damage, the pilot kept the aircraft on the step until past the end of a small peninsula. He then reduced power, lowered the water rudders, and turned to the left in the direction of a bay where his mooring site was located.

Once in the bay, instead of turning left, the aircraft tended to weathercock to the right into the wind, so the pilot attempted to turn 180 degrees to the right. As the aircraft turned through cross-wind, it rocked laterally, and the left wing lifted. The aircraft nosed down and then flipped over onto its back. The pilot escaped through the right door, but the passenger, although his seat-belt was released, failed to exit the aircraft, and drowned.

The pilot reported that the wind was from the south at about 25 knots. The investigation did not reveal any pre-accident aircraft malfunction or failure. Neither the pilot nor the passenger was wearing a life-jacket, although they were available in the aircraft; both were wearing parkas and hip-waders.

The pilot chose to land in the shelter of a small peninsula where the water appeared less rough than on the open lake. The pilot was familiar with the lake as he had been flying from it repeatedly in the previous ten years. The water was shallow in the landing area, and the pilot failed to notice the partially submerged rock. The rock was not easily discernible among the white caps. The pilot was also aware that the water level was five to six feet lower than usual.

The right float bottom was ripped open when it struck the rock; as a result, water entered the float. Although the aircraft was able to enter the bay, the strong cross-wind and the water-logged float kept pulling the aircraft to the right. The pilot applied full right rudder and added power in order to turn the aircraft around toward the shore. When the aircraft was cross-wind, the left wing, elevated because of the rocking motions of the aircraft and the water-logged right float, was caught by the strong winds, causing the aircraft to flip over.

The passenger may have become confused after the aircraft overturned; he headed toward the rear of the inclined fuselage, perhaps toward the light visible through the rear window instead of to his right, toward the aircraft door. In addition, his parka and hip-waders would have seriously impeded his freedom of movement.

FINDINGS:

Cause Related:

1. The right float was ripped open on touchdown when it struck a partially submerged rock.

2. The combination of the wind, waves, and water-logged float caused the aircraft to flip over.

3. The passenger did not exit the submerged aircraft for undetermined reasons.

Other:

1. Neither the pilot nor the passenger was wearing a life-jacket, although they were available in the aircraft.

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CESSNA 180 C-GASH
GREGOIRE LAKE, ALBERTA
03 JANUARY 1985

REPORT NUMBER: 85-W50001 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1255 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	90	15
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	-
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot, with three passengers on board, flew to the lake to go ice fishing. The aircraft landed and as it was slowing down, it began to weathercock to the right. As it turned, it slid sideways to the left causing the left main gear to fold under the fuselage.

The surface of the lake, which was large enough for an aircraft to land in any direction, was wind-swept and had hard-packed snow-drifts and clear ice patches. A weather station 12 miles to the north reported that the surface wind was 260 degrees magnetic (M) at 18 knots, and similar conditions were considered to be present at the lake. The landing was made on a heading of 167 degrees M, approximately 90 degrees to the wind direction. According to the Aeronautical Information Publication (AIP), the maximum 90-degree cross-wind for this type of aircraft is about 11 mph (7 knots). The surface wind exceeded the cross-wind value by about 10 knots.

The investigation revealed that the left main gear attachment nut had failed allowing the left gear to collapse. A laboratory examination of the nut concluded that the nut failed due to abnormally high loads. The nut was tight prior to the failure.

The investigators determined that as the aircraft slowed down, rudder effectiveness decreased and directional control was lost. As the aircraft turned, it slid sideways which imposed a high load on the left gear attachment

causing it to fail. Had the landing been made into wind, it is most likely that this sequence of events would not have occurred.

The emergency locator transmitter (ELT), did not function even though transmit light illuminated. It was determined that the make and packaging of the batteries were not in accordance with the manufacturer's approved battery pack. It was further found that four transistors were non-functional. The type of damage on the circuit board was consistent with the reversal of the battery pack leads.

The following laboratory reports were completed: LP 14/85-ELT Analysis, and LP 15/85-Main Gear Nut.

FINDINGS:

Cause Related:

1. The pilot landed the aircraft with an 18-knot cross-wind from the right.
2. The wind speed exceeded the recommended cross-wind limit of the aircraft and aircraft directional control was lost.
3. The left main gear attachment nut failed due to excessive side loads.

Other:

1. The ELT did not function because of a damaged circuit board which was a result of probable reversal of the leads from an unapproved battery pack.

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Aviation Occurrence Reports

PIPER PA-22-160 C-FKUX
LAC OSCAR, QUEBEC
04 FEBRUARY 1985

REPORT NUMBER: 85-Q50004 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1230 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	185	76
LAST 90 DAYS	17	17

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The ski-equipped aircraft was on a pleasure flight to a lake in an isolated area about 35 miles from its departure point. On landing, the aircraft could not be stopped in the distance remaining, and it struck rocks close to the shoreline before coming to rest against trees.

The pilot was unable to determine the wind direction at his destination and decided to land in a westerly direction, that is, into the direction of the wind at his departure point. As a result of a heading error, however, he landed in a south-southeasterly direction. The pilot estimated that the distance available for landing was 1,500 feet, whereas the actual distance was only 1,200 feet. This distance was also reduced by the fact that the pilot had to overfly the beginning of the lake at a height of about 50 feet in order to avoid some trees. The frozen lake surface was covered in compacted snow, with rocks penetrating the ice in some places.

The shock of the landing was insufficient to actuate the emergency locator transmitter (ELT), which was switched on by the pilot. The signal was intercepted by the Search and Rescue satellite (SARSAT). The occupants were rescued nine hours after the accident.

Because the pilot was unable to determine the wind direction and because of the heading error, the approach was made with a light tail-wind component. Since it was necessary to overfly the trees on the shoreline at a higher ground speed, the aircraft landed longer than expected.

The hard surface did not provide the anticipated braking power, and the aircraft could not be stopped in the distance available before striking rocks and trees.

FINDINGS:

Cause Related:

1. Because of a tail-wind component, a reduced landing distance, and a slippery surface, the pilot was unable to stop the aircraft in the space available.

Other:

1. The aircraft was located by SARSAT.

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CHAMPION 7GCB C-FPZF
STE-AGATHE-DES-MONTS, QUEBEC
11 FEBRUARY 1985

REPORT NUMBER: 85-Q50005 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1430 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	540	80
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the ski-equipped aircraft left his main base to land in a field used by ultralight aircraft. This field, which was about 850 feet long, was snow covered and fringed with trees. The approach was made at about 50 mph with full flap. The aircraft touched down about 100 feet before the edge of the field on a hard slippery surface, and the pilot decided to overshoot. During the climb, the speed decreased, and the aircraft settled into trees.

The pilot, who had limited experience on ski-equipped aircraft, went to this location at the repeated invitation of friends who were ultralight pilots. He considered that the runway length available was marginal.

All the indications are that the pilot allowed himself to be influenced by the ultralight aircraft pilots. Because of the hard slippery surface, the skis did not sink into the snow, and deceleration was poor. The overshoot was too late, since it did not allow a sufficient margin to climb before the aircraft reached the trees. As a result of its excessive nose-up attitude, the aircraft stalled above the trees.

FINDINGS:

Cause Related:

1. The pilot, influenced by friends who were ultralight pilots, attempted to land in an area too short for his aircraft.
2. After the landing, deceleration of the aircraft was poor because of the hard slippery surface.
3. Realizing that he could not stop in time, the pilot initiated an overshoot, but he was too late.
4. In order to clear the trees, the pilot raised the nose too high, and the aircraft stalled; as a result, it sank and crashed into the trees.

Other:

-Nil-

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CESSNA 185A C-FNSK
KATIMIK LAKE, MANITOBA
12 FEBRUARY 1985

REPORT NUMBER: 85-C50010 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1600 CST
OPERATION: Private Company Business
DAMAGE: Destroyed
PILOT LICENSE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,360	60
LAST 90 DAYS	18	18

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft departed on a visual flight rules (VFR) flight from St. Francois Xavier to Easterville, Manitoba to carry equipment to the company's customers. When the aircraft did not arrive, an emergency locator transmitter (ELT) search was carried out, and the aircraft was found on an ice-covered lake about 20 miles short of the destination. The aircraft had crashed at high speed and at a steep angle of descent. The pilot, the sole occupant on board, was killed on impact.

Investigation at the accident site did not reveal any evidence of pre-impact failures. The engine and propeller broke through the ice and were not recovered.

Based on an autopsy, there was no evidence of a medical problem that could have led to in-flight incapacitation of the pilot.

At the time and location of the accident, the visibility was poor due to blowing snow and snow showers. A nearby station reported the visibility as one-quarter mile in heavy snow. The area forecast predicted snow showers and the pilot was aware of this forecast. The aircraft had no radio navigational aids on board and, based on knowledge of previous flights, it is likely that the pilot attempted to follow a highway to the destination; the accident site was about one mile south of the only highway in the area. VFR navigation would have been extremely difficult or impossible under the weather conditions encountered. The pilot was instrument qualified but had limited recent practice.

The wreckage pattern indicated that the aircraft was in a steep, inverted spiral dive at the time of impact. Possible reasons for the spiral dive would be spatial disorientation or a loss of some flight instrument, perhaps due to icing. The reason for the loss of control could not be determined.

FINDINGS:

Cause Related:

1. The pilot departed on a VFR flight into known poor weather conditions.
2. A VFR flight was continued in poor weather.
3. Aircraft control was lost for undetermined reasons, and the aircraft struck the ground in a steep, inverted spiral dive.

Other:

- Nil -

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Aviation Occurrence Reports

BELLANCA 8-GCBC C-GNJE
GARDINER LAKE, ONTARIO
22 MARCH 1985

REPORT NUMBER: 85-O50021 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1600 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	102	18
LAST 90 DAYS	6	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The ski-equipped aircraft was about to land on an ice-covered lake, when a gust of wind caused the aircraft to float, thus delaying the touchdown. During the landing roll, the right wing struck an overhanging tree on the shoreline, and the aircraft pivoted to the right into the trees on shore.

The skies were clear, and the winds were gusty and variable from the right on landing.

As the surface was icy, the aircraft required considerable distance in which to stop, and the delayed touchdown increased the landing distance required. The pilot applied full left rudder during the landing roll in an attempt to turn the aircraft away from the shoreline, but the aircraft did not respond. During deceleration, the aircraft had a tendency to turn right into wind (weather-cock), and the rudder was not effective enough to overcome this tendency. The shoreline appeared straighter from the air than it actually was; it curved to the left, thus the landing distance was shorter than estimated by the pilot.

The landing area was marginally suitable due to its short length. The unanticipated increase in the landing distance caused by the gust and the inadequate rudder response during the landing roll resulted in the aircraft colliding with the trees on shore.

FINDINGS:

Cause Related:

1. The landing area was marginally suitable due to its short length.

2. The gusty wind conditions made precise aircraft control difficult.

Other:

-Nil-

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PIPER PA-18-150 SUPER CUB C-FIDE
CHIN LAKE, ONTARIO, 6 mi N
1 JUNE 1985

REPORT NUMBER: 85-O50039 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1000 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	449	191
LAST 90 DAYS	12	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

After take-off from a small lake in gusty wind conditions, the aircraft began to lose altitude. The pilot turned the aircraft downwind in an attempt to avoid tall trees bordering the lake. The aircraft was still unable to gain sufficient altitude to clear all the trees and crashed into them.

At the time of the occurrence, the winds were from the northwest, gusting to about 20 knots.

The pilot reported that the aircraft was below its maximum gross weight and that there were no mechanical failures or malfunctions.

The aircraft climb performance was adversely affected by the gusty wind conditions to the extent that it could not climb above the trees. By turning the aircraft downwind to avoid the obstacles, the pilot would have reduced his angle of climb which, in turn, would have hindered his attempt to clear the remaining trees.

FINDINGS:

Cause Related:

1. The aircraft climb performance was adversely affected by turbulent wind conditions during the take-off attempt.

Other:

-Nil-

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CESSNA 172N C-GFBE

LAC SERIEN, QUEBEC

02 JUNE 1985

REPORT NUMBER: 85-Q50019

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1845 EDT

OPERATION: Private Recreational

DAMAGE: Substantial

PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,000	800
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

On take-off, with 17 degrees of flap selected, the float-equipped aircraft began to climb above the water in a southwesterly direction and then over a wooded area at the end of the lake. During the climb, at about 100 feet and while just above the tree-tops, the aircraft began to settle. At about 500 feet from the lake, the left wing struck a tree, and the aircraft came to rest in the trees. The two occupants were not injured and were rescued by the Trenton Search and Rescue unit.

The emergency locator transmitter was in good operating condition but did not activate. There was sufficient fuel for the flight. The fuel was not contaminated, and there were no technical defects in the aircraft or engine.

Lac Sérien, which is approximately 850 feet above sea level (asl), is in a very wooded and rolling area. The tops of the surrounding hills are between 1,350 and 1,475 feet asl, and the terrain is no more than 100 feet above the level of the lake in the departure area. The distance of 3,000 feet available for take-off represented the full length of the lake. The float supplement to the pilot's operating manual indicates that a distance of ap-

proximately 2,500 feet is required to avoid an obstacle 50 feet high. The aircraft operating manual recommends using a maximum of 10 degrees of flap for the take-off.

The lake is located approximately 30 nautical miles northwest of the Petawawa military base. The weather report issued by that base for the date, time, and location of the accident indicated 12-knot winds with gusts to 22 knots at 260 degrees and a temperature of 20 degrees Celsius. The pilot stated that, at the time of the accident, the visibility was at least 25 miles, with a head wind and downdrafts, and the ceiling was estimated at 12,000 feet.

The pilot had taken off from that lake with his aircraft on several occasions, using basically the same distance and trajectory but in less turbulent weather.

In early 1982, the accident aircraft had been modified according to supplemental type certifications (STCs) SA332GL, SA181GL, SA1161SO, and SA910CE. Following satisfactory flight tests conducted by the pilot/owner, Transport Canada issued a Certificate of Airworthiness. The modifications consisted of installing a more powerful engine (180 horsepower instead of 160), a variable pitch propeller, fiberglass floats, and a Horton Stoll Craft kit. These modifications reportedly greatly improved the take-off and climb performance of the aircraft. The pilot was under the impression that 17 degrees of flap had been recommended for take-off which he thought would provide for maximum lift. The STOL kit manufacturer, however, did not specify the use of flaps other than that specified in the Aircraft Handbook provided by Cessna.

The maximum allowable take-off weight of the Cessna 172N (unmodified) with floats is 2,200 pounds. The weight of the aircraft on take-off was 2,050 pounds. Its weight and balance were within the manufacturer's specifications. The float supplement to the pilot's operating manual indicates that a distance of approximately 2,500 feet is required to avoid an obstacle 50 feet high.

The gusts of wind blowing over a succession of hills created the downdrafts mentioned by the pilot. The climb rate was reduced owing to the use of 17 degrees of flap on take-off instead of the recommended 10 degrees. The aircraft entered the back side of the thrust curve (slow flight) and settled into the trees. The impact was not sufficiently violent to activate the emergency locator transmitter.

FINDINGS:

Cause Related:

1. On take-off, the pilot did not use the flap position recommended by the manufacturer, and, as a result, the rate of climb was reduced.

Aviation Occurrence Reports

2. The climb was hindered by downdrafts; the aircraft entered the back side of the thrust curve and settled.

Other:

- Nil -

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REPUBLIC SEABEE RC 3 (Amphibious) C-FKCR
SAINT-JEAN, QUEBEC 6 mi S
07 JUNE 1985

REPORT NUMBER: 85-Q50023 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1845 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,500	65
LAST 90 DAYS	4	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

Fifteen minutes after take-off from the Saint-Jean Airport, Quebec, the pilot of the amphibious aircraft carried out a water landing approach to the Richelieu River. The approach was made with reduced power in a light crosswind from the left. Immediately after touching the water, the aircraft nosed over.

No pre-accident mechanical failure was identified by the investigation. It was determined that the wheels were down when the aircraft landed. It was also established that the pilot did not have a float endorsement, contrary to the regulation requiring a pilot to have this endorsement before using water surfaces.

The occupants, who were wearing life preservers, were able to exit the aircraft through the windshield, which had shattered on impact.

The pilot, who was not qualified for the manoeuvre he undertook, omitted to check that the gear was up and locked before carrying out the water landing approach to the river. As a result of the violent braking effect exerted on the aircraft by the wheels and the lever effect of the gear struts on the fuselage, the aircraft nosed over. Since the occupants were wearing life preservers, the risk of drowning after the impact was considerably reduced.

FINDINGS:

Cause Related:

1. The pilot omitted to confirm that the gear was up and locked before approaching to land.

2. Because the wheels were down when the amphibious aircraft touched the water, it nosed over.

Other:

1. The risk of drowning after the impact was considerably reduced because the occupants were wearing life preservers.

2. The pilot was not qualified to make the water landing manoeuvre he undertook.

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CESSNA A185E C-FZNN
ST-CYR LAKE, QUÉBEC
27 JUNE 1985

REPORT NUMBER: 85-Q50029 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1300 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	450	125
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot was taking off toward the south southeast in the float-equipped aircraft. After the aircraft was on the step, the pilot experienced difficulty in maintaining directional and lateral control of the aircraft. He rejected the take-off because of the control difficulty and because of the short distance remaining in which to complete the take-off. He retarded the throttle and pulled hard on the yoke. The airplane began to settle back onto the water in a nose-high attitude. A strong gust of wind then lifted the left wing, and the right wing went into the water. The right float dug in, submerged, and the aircraft nosed over. All three occupants successfully abandoned the aircraft and were rescued.

The aircraft weight and centre of gravity were well within the prescribed limits. There were no known

aircraft mechanical deficiencies. The weather conditions were suitable for visual flight; the wind, which was from the southeast at about 20 mph, was variable and gusty.

Once the decision was made to reject the take-off, the pilot, in his haste to maximize aerodynamic braking, pulled hard on the yoke, which raised the nose and exposed the underside of the left wing to the wind. As the left wing went up, the opposite wing went down and the right float dug in, resulting in the aircraft cartwheeling and nosing over.

FINDINGS:

Cause Related:

1. An area of marginal length was selected for the take-off run.
2. During the take-off run, lateral and directional control was lost in strong cross-wind conditions, and the take-off was rejected.
3. The aircraft nosed over during the rejected take-off because of inappropriate control inputs and gusty winds.

Other:

-Nil-

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CESSNA 185 C-FRSL
MONTREAL-NORD, QUEBEC
30 JUNE 1985

REPORT NUMBER: 85-Q50030 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0900 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	241	123
LAST 90 DAYS	14	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	1	2

SUMMARY REPORT:

The pilot of the float-equipped aircraft was leaving for a pleasure flight to Parent, Quebec with his wife and two children. After making the usual checks and selecting 20

degrees of flap, the pilot took off into a light head wind along the river which is crossed by high-voltage power lines 2,700 metres further downstream. During the initial climb, when the pilot throttled back, the engine lost some power. At about 1,000 metres from the hydro lines, the pilot decided to turn left in order to return and align close to his departure point. When the aircraft began to lose altitude, the pilot reduced flap to 10 degrees. The aircraft touched the water surface in the middle of the river in an almost horizontal attitude, nosed down, and overturned.

PERTINENT INFORMATION:

The auxiliary gas pump was in the LOW position during take-off. The aircraft operating manual states that, when the auxiliary pump is operating, the mixture becomes overrich at certain power settings, and this may cause a partial power loss, depending on the mechanical pump flow rate adjustment. The auxiliary pump should be in the OFF position during take-off. Subsequent testing established that the engine was operating normally.

The pilot had problems in learning to fly and was still experiencing difficulties, especially during landings. His floatplane instructor had noted that the pilot frequently landed the aircraft with the nose too low and had often brought this to his attention.

ANALYSIS:

During his usual checks, the pilot failed to note that the gas pump was in the LOW position, and, when power was reduced during the initial climb, the engine lost partial power. Worried by this slight power loss and the hydro lines ahead, the pilot decided to turn left in order to return and land in the direction opposite to his take-off. Because the aircraft was losing altitude during the turn, the pilot reduced flap by 10 degrees in order to reach the river. Since he did not round out during the landing, the aircraft nosed down and overturned.

FINDINGS:

Cause Related:

1. The auxiliary gas pump switch was in the LOW position during take-off because the pilot had not adjusted it to the OFF position during his pre-take-off checks.
2. Because of an overrich mixture resulting from excessive pressure caused by the auxiliary pump, the engine lost partial power.

Aviation Occurrence Reports

3. Worried by the partial power loss and the hydro lines ahead, the pilot turned left in order to return and land in the direction opposite to his take-off.

4. Since the pilot did not round out during the landing, the aircraft nosed down and overturned.

Other:

1. The pilot had problems in learning to fly and was still experiencing difficulties, especially during landings.

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CESSNA 180B SKYWAGON C-FLUJ
THALBERG, MANITOBA 2 mi S
30 JUNE 1985

REPORT NUMBER: 85-C50047 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1440 CDT
OPERATION: Private Training
DAMAGE: Destroyed
PILOT LICENCE: Senior Commercial

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	1,300	30	950	300
LAST 90 DAYS	175	30	35	35

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The private pilot/owner of the float-equipped aircraft was being given under-the-hood instrument instruction by a senior commercial instructor pilot. They had flown from Selkirk to Brereton Lake, Manitoba and were conducting a return flight after having stopped for lunch.

The pilot/owner was at the controls and was carrying out a 45-degree turn at 3,000 feet above ground level when the aircraft engine (Continental O-470) began to run rough and lost some power. Shortly thereafter, the aircraft windshield was splattered with engine oil, and smoke emanated from the engine compartment. As there was no water surface available for landing, the pilot selected a cultivated field. He then applied full flap and turned into wind. By the time the aircraft had touched down, the interior cabin was full of smoke, and flames could be seen externally along the lower front engine cowling. The aircraft touched down in a flat attitude, slid along on the floats for a short distance, and then

nosed over. The crew climbed uninjured from the aircraft and vacated the area, fearing the burning aircraft might explode. The aircraft was destroyed by fire.

The aircraft weight and centre of gravity were within the prescribed limits. The aircraft appeared to have been maintained in accordance with the manufacturer's requirements, and no aircraft discrepancies were reported prior to the occurrence. The aircraft was being operated using approved aviation grade gasoline.

The number six cylinder connecting rod cap had failed, causing the connecting rod to chatter against and deform the crank pin. The connecting rod bolts then failed, and the connecting rod and piston assembly dropped into the path of the crankshaft below the cylinder sleeve. The crankshaft shattered the piston skirt and drove the number six connecting rod out through the engine crankcase. The in-flight fire started when oil and fuel escaped from the ruptured engine.

Only one half of the connecting rod cap could be found after the occurrence. This portion of the cap was discoloured and crusted with burned oil deposits. The connecting rod cap failed because of a lack of lubrication. The reason for the lack of lubrication could not be determined. The engine driven oil pump, although contaminated by metal, remained functional.

FINDINGS:

Cause Related:

1. While in normal flight, the number six cylinder connecting rod cap failed because of a lack of lubrication, causing extensive engine damage. The reason for the lack of lubrication could not be determined.

2. An in-flight fire ensued as oil and fuel escaped from the failed cylinder and crankcase.

3. The float-equipped aircraft nosed over after touching down in a cultivated field.

4. The aircraft was destroyed by fire.

Other:

-Nil-

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CESSNA 180A C-FLPW
CHENAL DU MOINE, QUEBEC
18 JULY 1985

REPORT NUMBER: 85-Q50034 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1500 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	554	110
LAST 90 DAYS	38	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

As the aircraft was taking off from a river, a high-speed pleasure boat approached from the right and cut in front of the aircraft. The pilot retarded the throttle and turned left to avoid collision with the moving boat. Before coming to a stop, the aircraft struck two boats tied to a dock on shore.

The pilot stated that, prior to the take-off attempt, he had verified that the take-off area was clear of other water traffic. It appeared to the pilot that the operator of the boat had purposely come close to the aircraft, perhaps not realizing that there was a danger of collision or that the aircraft could not manoeuvre easily on the water. The pilot was forced to reject the take-off and turn toward the river bank in order to avoid a collision with the motor boat.

FINDINGS:

Cause Related:

1. The operator of the motor boat came too close to the aircraft taking off.
2. The aircraft struck stationary boats while being manoeuvred to avoid a collision with the moving boat.

Other:

- Nil -

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CESSNA 180 C-GACR
WABUSH, NEWFOUNDLAND 79 mi NW
21 JULY 1985

REPORT NUMBER 85-Q50035
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	580	450
LAST 90 DAYS	8	8

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	2	-

HISTORY OF THE FLIGHT:

The float-equipped aircraft, carrying four occupants, was returning from a fishing trip. After take-off, the pilot began a steep left turn while in his initial climb. During the turn, the aircraft nosed down and struck the lake. One of the passengers seated in the rear was thrown violently against the pilot upon impact. Both were rendered unconscious by their injuries and later drowned. The other two passengers were seriously injured, but they managed to exit the aircraft together and swim to shore with the aid of a life-preserver. They were rescued a few hours later by a civilian helicopter dispatched to search for them. The wreckage was located by means of the emergency locator transmitter.

PERTINENT INFORMATION:

The lake measured 7,900 feet by 1,600 feet and was oriented east/west; the south and west shores were bordered by hills rising to a height of 150 feet above the lake. The aircraft was taking off in a westerly direction.

The aircraft showed no technical defects, and the engine was turning at a very high rpm on impact. The weight of the aircraft was at least 177 pounds over the maximum allowable take-off weight, and the centre of gravity was within the prescribed limits. An examination of the wreckage determined that the flaps were partially deployed on take-off.

The weather conditions were suitable for visual flight. The surface winds were fluctuating between west and northwest at 16 knots, with gusts up to 26 knots. The winds produced moderate turbulence, which became severe when convection clouds were present.

Aviation Occurrence Reports

Only the pilot was wearing his seat-belt. The passengers had not been advised to fasten their seat-belts during the pre-take-off check.

ANALYSIS:

The steep turn produced an increase in the apparent weight of the aircraft; the actual weight of the aircraft already exceeded the maximum allowable weight. The overloading increased the stall speed and the turbulence also produced considerable variations in speed. As a result, the aircraft stalled into the lake.

The violence of the impact dislodged the passengers from their seats; had seat-belts been fastened, the passengers' injuries would have been minimized.

FINDINGS:

Caused Related:

1. The steep turn executed by the overloaded aircraft, in turbulence, increased the stall speed, and the aircraft stalled.

2. The stall occurred at low height, precluding any possibility of regaining control.

Other:

- Nil -

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CESSNA U206F C-FQKW
BONNEVILLE LAKE, QUÉBEC
22 JULY 1985

REPORT NUMBER: 85-Q50036 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1715 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,000	970
LAST 90 DAYS	24	22

	FATAL	SERIOUS	MINOR/NONE
INJURIES:			
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was returning to Ottawa after a week-long fishing expedition. The float-equipped aircraft was downwind at 400 feet above the water for a landing on Bonneville Lake, when the pilot switched from the almost empty right tank to the full left tank, and the engine stopped. The pilot reselected the right tank and turned on the auxiliary fuel boost pump, but he was unable to restart the engine. As the pilot attempted to turn into wind for landing, the nose dropped, and the aircraft rolled right. The pilot levelled the wings and began to raise the nose, but the aircraft struck the water, damaging the right float, engine cowling, and fuselage.

Between previous trips on this same expedition, the pilot had twice refuelled the aircraft from fuel drums using a filter made of a felt material. During a flight following the first refuelling, a temporary loss of engine power was experienced, and the pilot observed a low reading on the engine fuel flow gauge. On several occasions during flights subsequent to the second refuelling, the pilot force-landed the aircraft because of partial engine power losses and low fuel flow readings. In each instance, after a period of 30 to 40 minutes with the engine shut down, the pilot was able to restart the engine and become airborne again.

During the investigation, a substantial amount of water was drained from the left inboard wing tank and the fuel servo unit filter; five of the six cylinder head fuel nozzles were found to be almost completely obstructed by felt fibres.

The problem of water in the fuel tanks of the Cessna 206 aircraft is well known. The correct method to purge water from the fuel system is specified in Airworthiness Directive 84-10-01. Also, there is a greater risk of water

contamination in fuel supplied from drums than in fuel supplied from other accepted sources. Good airmanship dictates that certain checks be carried out and certain precautions taken when refuelling from drums to guard against water contamination of the aircraft fuel system. This was not done by the pilot.

The losses of engine power and the restriction of the fuel flow were caused by water and felt fibre contamination of the fuel. The water most likely entered the fuel system when the aircraft was refuelled with water-contaminated fuel from the fuel drums. The use of the felt filter resulted in felt fibres entering the fuel system and clogging the filter and nozzles.

When the engine stopped on the accident flight, the pilot stalled the aircraft while attempting the turn to land, and there was insufficient altitude to permit a recovery.

FINDINGS:

Cause Related:

1. The engine stopped because the fuel system was contaminated with water and felt fibres, and the aircraft was damaged during the subsequent forced landing.
2. The pilot did not follow the accepted procedures for refuelling from drums.
3. Because the pilot used a felt filter during refuelling, the aircraft fuel system was contaminated with felt fibres.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

Since this occurrence Transport Canada has amended the Aeronautical Information Publication (A.I.P.) Canada (Air) section 1.2.2 to read:

A chamois or felt-lined filter funnel may only be used under dire emergency conditions, recognizing that filter fibres may clog fuel system filters and nozzles. After the emergency flight, the aircraft should be checked following approved maintenance instructions for a contaminated fuel system.

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CESSNA 185E C-FCTO
SANDSPIT AIRPORT, BRITISH COLUMBIA
13 AUGUST 1985

REPORT NUMBER: 85-P50040 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1125 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	80	30
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The amphibious float-equipped aircraft took off from the water at Queen Charlotte City en route to Sandspit Airport. Upon landing at Sandspit, the pilot applied the brakes, and the aircraft veered left off the runway. The pilot was unable to stop the aircraft using brakes, and the aircraft struck the terminal building.

The aircraft was flown to Sandspit to refuel and to see if an aircraft mechanic would look at the brakes, as the pilot had noticed that they were ineffective on a previous flight. A post-accident examination of the brakes found evidence of pre-occurrence failure of the right main brake unit. The right inside piston O ring had broken, and, as a result, the brake system was depleted of brake fluid. Because of the unserviceable brakes, the pilot attempted to maintain engine power and use rudder for directional control, but was unable to maintain control of the aircraft.

FINDINGS:

Cause Related:

1. The pilot attempted flight with a known unserviceability.
2. The aircraft brakes were ineffective; as a result, the pilot was unable to stop the aircraft, and it struck the terminal building.

Other:

-Nil-

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Aviation Occurrence Reports

CESSNA 180H SKYWAGON C-FYFM
EDGE LAKE, QUÉBEC
14 AUGUST 1985

REPORT NUMBER: 85-Q50043 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1200 EDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,300	900
LAST 90 DAYS	113	103

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was on a visual flight rules (VFR) flight to Wemindji. Initially, the weather conditions were suitable for visual flight. As the flight progressed, the weather conditions deteriorated rapidly. The pilot circumnavigated low lying cloud banks but was later forced to descend in order to remain visual. During the descent, the pilot spotted a lake and decided to carry out a precautionary landing. While descending downwind, the pilot, who had no actual instrument flying experience, inadvertently entered a low cloud, lost visual reference with the ground, and stalled the aircraft. When he regained sight of the surface, the pilot had insufficient altitude to recover, and the aircraft struck the lake surface. The right float was substantially damaged, and the aircraft capsized shortly after. The occupants abandoned the aircraft and reached the shore safely.

The pilot was aware from a forecast obtained the previous day that the region was under the influence of a low pressure system and a warm front. The pilot reported that at the time of take-off, there was a 1,500-foot ceiling, the visibility was 15 miles, and the region to the west, in the direction of the flight, appeared to be clearing up.

The pilot experienced disorientation when he entered the cloud. As a result, he lost control of the aircraft, and the aircraft stalled.

FINDINGS:

Cause Related:

1. The pilot continued visual flight into deteriorating weather conditions.

2. The pilot experienced disorientation when he entered a low lying cloud bank; as a result, he lost control of the aircraft, and the aircraft stalled.

3. Because of insufficient altitude to recover from the stall, the aircraft struck the lake surface and was substantially damaged.

Other:

-Nil-

→ → → → →

CESSNA 180H SKYWAGON C-FVSE
LYNX LAKE, NORTHWEST TERRITORIES
19 AUGUST 1985

BRIEF NUMBER: 85-C50071 (Accident)
LOCAL TIME: 0830 CDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private (Invalid)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	700	500
LAST 90 DAYS	150	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

During the pre-flight run-up, the engine of the float-equipped aircraft ran rough, and the pilot applied carburettor heat to rectify the problem. The pilot then selected the carburettor heat off and took off from the lake. At approximately 100 feet above ground level, the engine lost all power. The aircraft stalled and landed hard on the surface of the lake. The aircraft wings failed downward, the float assemblies failed, and the engine separated from the airframe.

Severe carburettor icing conditions were reported in the general area.

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CESSNA A185F C-GAEG
LAC DES PETITES PLAGES, QUEBEC
27 AUGUST 1985

REPORT NUMBER: 85-Q50051 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1200 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,958	Unknown
LAST 90 DAYS	100	100

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	1	1

HISTORY OF THE FLIGHT:

The float-equipped aircraft, with four occupants on board, was on a visual flight from Rouyn to Lac des Petites Plages, Quebec. While the aircraft was on final approach, the pilot executed a right-hand turn close to the surface of the water, and the right float struck the water. The aircraft pivoted to the right and sank. The pilot and a passenger seated behind him drowned. The remaining two passengers, one of which was seriously injured, were rescued the following morning.

PERTINENT INFORMATION:

No discrepancies were found with any of the aircraft's systems.

The aircraft was equipped with three seats, and the seat-belts were used by three of the occupants. The seat-belts resisted the impact. The fourth occupant sat unsecured on a wooden box behind the passenger occupying the front seat. There were no life-vests available in the aircraft. The pilot and passenger who drowned received no injuries as a result of the accident and were both found inside the aircraft.

The emergency locator transmitter (ELT) was found in the OFF position, while its remote control in the cockpit was in the ON position. The ELT did not activate.

Because of bad weather encountered en route before reaching destination, the pilot landed twice at different lakes. He then proceeded to his destination, with which he was familiar, where good visibility with a low cloud base, estimated by the pilot to be 400 feet above ground level, existed. The wind was light and caused small ripples on the water.

ANALYSIS:

For undetermined reasons, while on short final approach and at an altitude close to the water surface, the pilot executed a right turn which did not allow sufficient clearance to complete the turn safely. During the turn, the right float of the aircraft struck the water surface, causing the aircraft to pivot to the right and sink.

FINDINGS:

Cause Related:

1. The right float of the aircraft struck the water during a turn which was executed close to the water surface.
2. There were only three seats on board the aircraft; one passenger, sitting on a wooden box, had no seat-belt and suffered serious injuries.

Others:

1. The ELT did not activate as it was found in the OFF position, while its cockpit remote control was in the ON position.
2. No life-vests were carried on board the aircraft.

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CESSNA U206F C-GEDO
BARRIE, ONTARIO 4 mi N
30 AUGUST 1985

REPORT NUMBER: 85-Q50068 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1700 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,500	1,200
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The float-equipped aircraft, with the pilot and one passenger on board, took off from Little Lake, Ontario, on a flight to Lac Kipawa, about 200 miles away. During the climb-out, and at an altitude of approximately 300 feet above ground, the aircraft engine (Continental IO-520D) lost power. The pilot attempted to restore engine power

Aviation Occurrence Reports

by turning the auxiliary electric fuel pump on and switching fuel tanks but was unsuccessful. On final approach to a field straight ahead, the aircraft floats struck power lines, and the aircraft pitched nose down onto a roadway, where it came to rest in an inverted position.

The aircraft had been fuelled to capacity and parked at the pilot's dock on Little Lake six days prior to the accident flight. A considerable amount of rain had fallen during this time. Just prior to the flight, the pilot drained both aircraft fuel tank sumps and the gascolator bowl. He found some water contamination in the wing tanks but, after redraining them, was satisfied that all water had been removed. Because of the impact damage and the inverted position in which the aircraft came to rest, investigators were unable to obtain a usable fuel sample from the aircraft wing tanks. Examination of the aircraft engine fuel system revealed water contamination in the fuel injector unit and in lines to the cylinder injection nozzles. The engine driven fuel pump was rendered inoperative because the pressure regulator screw was found dislodged. Laboratory examination of the fuel pump revealed that the screw had been dislodged on impact and was not a pre-impact failure.

It is concluded that water remained trapped in the aircraft fuel tanks, even though the pilot had drained the sumps prior to take-off. The movement of the aircraft during taxiing and take-off dislodged the water, and it entered the aircraft engine fuel injection system, causing the engine to stop.

Water contamination entering the fuel tanks via defective fuel filler caps and seals and water entrapment due to wrinkles in the floor of the rubber fuel cell of this type aircraft were the subject of Airworthiness Directive (AWD) 84-10-01. If fluid entrapment exceeded three ounces after totally draining the fuel tanks through the sumps, then the aircraft was to be placarded with a special fuel sump draining procedure laid down in the AWD.

The AWD had been accomplished on the aircraft, and it was not required to placard the aircraft with a special fuel sump draining procedure. There was no evidence of deteriorated fuel filler cap seals.

The following laboratory report was completed: LP 203/85 - Fuel Pump.

FINDINGS:

Cause Related:

1. Water remained in the aircraft fuel tanks even though the pilot drained the fuel tank sumps.

2. The aircraft engine stopped because of water contamination in the fuel.

3. The aircraft struck power lines on final approach to force-land in a field.

Other:

-Nil-

→ → → → →

TEAL TSC 1A2 C-GSXQ
BIG RIDEAU LAKE, ONTARIO
02 SEPTEMBER 1985

REPORT NUMBER: 85-O/50066 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1550 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	720	15
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	1

SUMMARY REPORT:

The pilot was taking a friend and his friend's two-year-old son for a pleasure flight in his recently purchased amphibious aircraft. The pilot taxied out onto the lake, and a normal into-wind water take-off was initiated. Early in the planing stage of the take-off, the aircraft began to porpoise. On the third impact, the nose dug in, and the aircraft nosed over in the water. The friend was able to evacuate the aircraft without difficulty but had to rescue his son and the unconscious pilot from the cockpit. Local boaters, who were on the scene within two minutes, transported the aircraft occupants to a nearby town for treatment. The child sustained serious injuries.

At the time of the accident, the lake had small choppy waves, six inches or less. The wind speed was 10 knots, and the take-off was made into wind and waves. There were no mechanical, medical, or environmental factors which contributed to the accident. It was determined that the aircraft became airborne prematurely at or near its stalling speed of 52 mph. The manufacturer recommends maintaining the planing attitude until a speed of 65 mph is reached, before initiating the lift-off. When the porpoising sequence began, the pilot did not take corrective action, and, as a result, the aircraft nosed over.

The pilot, who was recently endorsed on seaplanes, apparently did not recognize the onset of the porpoise, and, consequently, he did not take corrective action.

The pilot was not wearing the installed shoulder harness. The friend was unaware that a shoulder harness was available and had not been briefed about the emergency equipment. The aircraft occupants suffered flail-type injuries to their upper bodies. Had they used the shoulder harnesses available, these injuries would have been less severe. As there were only two seats with seatbelts available, the child could not be restrained as required by regulations and, as a result, sustained serious injuries.

The following laboratory report was completed:
LP 217/85 - Photo Analysis Teal TSC-2A C-GSXQ.

FINDINGS:

Cause Related:

1. The aircraft lifted off the water prematurely at or near its stalling speed; the aircraft porpoised and nosed over into the water.
2. The pilot had little seaplane experience, and, as a result, he apparently did not recognize the onset of the porpoise, and, consequently, he did not take corrective action.
3. Injuries would have been less severe had the shoulder harness provided been used.
4. The child was not restrained and sustained serious injuries.

Other:

-Nil-

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CESSNA 180H CF-YVS
NORTHWEST POND, NEWFOUNDLAND
17 SEPTEMBER 1985

REPORT NUMBER: 85-A50027 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1250 NDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	152	50
LAST 90 DAYS	18	18

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot of the float-equipped aircraft was departing from a lake. During the take-off run, the pilot observed an obstacle in the water ahead of him. In an effort to avoid the rock, he applied right rudder, and the right wing dropped and struck the water. The aircraft then rolled to the left, and the left wing struck the water. The aircraft righted itself, and the pilot taxied to shore.

The investigation revealed that before starting the take-off run, the pilot had not carried out an inspection of the lake, and in particular the take-off path. The flight control inputs used to avoid the obstacles resulted in a loss of attitudinal control, which caused the wings to strike the water.

FINDINGS:

Cause Related:

1. The pilot did not carry out an inspection of the proposed take-off path.
2. The flight control inputs used to avoid the obstacle resulted in a loss of attitudinal control which caused the wings to strike the water.

Other:

-Nil-

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Aviation Occurrence Reports

CESSNA 180 CF-IUF
RIVIERE PIPICHICAU, QUEBEC
17 SEPTEMBER 1985

BRIEF NUMBER: 85-Q50058 (Accident)
LOCAL TIME: 1700 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	455	56
LAST 90 DAYS	88	56

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

While taxiing up the river for the take-off, the pilot moved the carburettor heat control to the cold position. During the initial climb, at about 150 feet above ground level (agl), the pilot reduced the power to 2100 rpm. The engine misfired, and the engine power continued to drop to 1500 rpm. The pilot opened the throttle and moved the carburettor heat control to the warm position, while making a 180-degree right turn so that he could make a precautionary landing on the river. The aircraft did not reach the expected point; it hit the tree-tops and crashed to the ground, about 100 feet from the river. The pilot escaped uninjured and was rescued about 20 minutes after the event.

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CESSNA 180E C-GYPY
BLACK STURGEON LAKE, ONTARIO
03 OCTOBER 1985

REPORT NUMBER: 85-C50084 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1800 CDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	98	28
LAST 90 DAYS	11	11

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

As the pilot flared his float-equipped Cessna 180 for landing at his home base he was blinded by the low sun. Just as he was about to overshoot, the floats touched the water, the aircraft skipped, dug in, and flipped onto its back. The pilot and passenger escaped from the aircraft and were rescued by people nearby.

There were no known aircraft unserviceabilities or failures. The weather was good, the winds were light, and the lake surface was rippled.

The pilot had relatively limited experience, although he was familiar and current with water landings. He did not anticipate the effect of the sun during the critical nose-up landing phase. Before he could effect corrective action, the floats contacted the surface at an angle causing the aircraft to flip onto its back.

FINDINGS:

Cause Related:

1. The pilot's vision was impaired by the sun during the flare for landing.

Other:

-Nil-

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CESSNA 172M C-GNUO
TERRINGTON BASIN, LABRADOR
03 OCTOBER 1985

REPORT NUMBER: 85-A54098 (Incident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1400 NDT
OPERATION: Private Recreational
DAMAGE: Minor
PILOT LICENCE: Senior Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,000	500
LAST 90 DAYS	280	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

After completing an en route refuelling stop, the pilot was water taxiing to position for take-off. The wind speed was 16 knots gusting to 25 knots. As the aircraft was turned into wind for take-off, a gust of wind lifted the wing and rolled the aircraft onto its back.

The pilot, in preparation for departure, elected to raise the water rudders, prior to completing the turn into wind. While doing so, his attention was diverted to the inside of the cockpit, and, when the unexpected gust of wind lifted the wing, he was unable to prevent the aircraft from rolling over.

FINDINGS:

Cause Related:

1. The pilot's attention was diverted, and he was unable to stop the aircraft from rolling over when the gust of wind lifted the wing.

Other:

-Nil-

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CESSNA A185E C-FVMS
SOUTH HAZEN LAKE, ONTARIO
09 OCTOBER 1985

REPORT NUMBER: 85-O50079 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1200 EDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	1,100
LAST 90 DAYS	65	65

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	3	-

SUMMARY REPORT:

The float-equipped aircraft took off from a tree-lined-lake. As the aircraft crossed the shoreline at an altitude of about 50 feet above ground level (agl), it rolled abruptly to the right and descended. The right wing tip struck the ground, and the aircraft cartwheeled and nosed over. Fuel which had sprayed from the aircraft's ruptured wing tanks ignited, and the aircraft was destroyed by the fire.

Moderate mechanical turbulence below 3,000 feet due to the strong, gusty surface winds was forecast for the area in the aviation weather forecast. These conditions were prevalent at the lake at the time of the occurrence. The pilot had been at the lake for several days, and his only weather information had been the public weather reports received on his portable AM radio; however, these reports did not include warnings of the turbulence. The aircraft encountered the turbulent, gusty conditions on climb-out.

The pilot selected 20 degrees of flap for take-off and, immediately after take-off, raised the flaps to 10 degrees, thereby increasing the stall speed.

At this point, the aircraft encountered turbulence and gusty winds, rolled into a steep bank attitude, and stalled. The altitude was insufficient to allow the pilot to take recovery action.

FINDINGS:

Cause Related:

1. The stall speed of the aircraft was increased by raising the flaps from 20 to 10 degrees immediately after lift-off.

Aviation Occurrence Reports

2. The aircraft rolled into a steep bank attitude and stalled when it encountered turbulence and gusty winds.

3. The stall occurred at such a low altitude that recovery was not possible before the aircraft struck the ground.

Other:

-Nil-

→ → → → →

CESSNA 180C CF-LTZ

RAPIDES DES JOACHIMS, QUEBEC 30 mi N

24 OCTOBER 1985

REPORT NUMBER: 85-Q50062 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 1430 EDT

OPERATION: Private Recreational

DAMAGE: Substantial

PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,000	1,500
LAST 90 DAYS	33	33

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot was making the return flight between Rapides des Joachims and Lac Marion, Quebec, accompanied by his wife and son. Thirty-five minutes after take-off, the engine lost all power, and the pilot landed in a wooded area. The aircraft crashed into some trees, and the distress beacon (EBC-102A) went off. The occupants, who were not injured, were rescued 11 hours after the crash.

The pilot had estimated that the flight to Rapides des Joachims would take 20 minutes. However, rain along the route forced the pilot to change his course, thus lengthening the flight time.

After the crash, the tanks, which had not been damaged, were empty. During his pre-flight preparations, the pilot dipped the wing tanks and found that they contained sufficient fuel for 50 minutes of flight. Deciding to add 12 gallons of fuel, the pilot inserted the fuel nozzle into the tank and left it unattended while an inexperienced assistant activated the hand pump. Pumping was stopped when an indicated 12 gallons had been pumped; however, the pump had not been primed, and no fuel had been transferred. The nozzle was removed, but the tanks were not dipped a second time.

Thirty-five minutes after take-off, the engine lost power when the fuel was exhausted.

According to Section 544 of the Air Regulations, the amount of fuel on board at the commencement of any visual flight rules (VFR) flight must be sufficient to fly to the place of intended landing and thereafter for 45 minutes at normal cruising speed. The distress beacon went off automatically on impact. After evacuating the aircraft, the pilot turned off the distress beacon but turned it on again intermittently several hours after the accident, believing that help would not come until the following day.

FINDINGS:

Cause Related:

1. The pilot did not ensure that he had sufficient fuel to fly to his destination, and the engine failed because it was out of fuel.

Other:

1. The pilot decided to activate the distress beacon intermittently several hours after the accident, believing that help would not come until the following day.

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CESSNA 185E C-FJLB

GOOSE BAY, LABRADOR 29 mi E

14 NOVEMBER 1985

REPORT NUMBER: 85-A50032 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1620 AST

OPERATION: Private Company Business

DAMAGE: Substantial

PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,000	4,000
LAST 90 DAYS	120	120

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was returning to Goose Bay, Labrador after having delivered freight to two locations on the Labrador coast. The pilot was following the south shore of Lake Melville and was 29 miles east of Goose Bay when the engine stopped. He attempted to restart the engine by turning on the boost pump and reselecting the

fuel tanks but was unsuccessful. The pilot carried out a forced landing onto a frozen bog.

A visual examination revealed that there was a sufficient amount of fuel remaining in the tanks to complete the flight. Post-accident water paste tests indicated the presence of moisture in both wing tanks. During the three days prior to the accident, the temperatures ranged from -8 to -15 degrees Celsius.

In an attempt to determine if there was sufficient fuel flow to the engine, the filter was removed. It was noted that the strainer was clear of any dirt or contamination; however, several marble-sized pieces of ice were present in the line to the strainer. When the ice was removed and the fuel filter reinstalled, positive fuel flow was restored, and the engine started and ran normally.

Prior to departing Goose Bay, the pilot had drained fuel from the fuel tanks and had not detected any water. However, water had accumulated at the 90-degree elbow in the inlet of the filter housing and had frozen. This eventually blocked the fuel flow and starved the engine of fuel.

FINDINGS:

Cause Related:

1. Water in the fuel system froze, and, as a result, the engine lost power due to fuel starvation.

Other:

-Nil-

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PIPER J3C-65 C-FKBF
LAC TOUGAS, QUEBEC
26 NOVEMBER 1985

BRIEF NUMBER: 85-Q50069 (Accident)
LOCAL TIME: 1500 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	600	600
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot of the ski-equipped aircraft made two touch-and-go landings on the snow-covered lake to check the surface conditions. He kept the engine power and aircraft speed up during the checks. During the third landing, the engine missed when power was applied to overshoot, and the aircraft slowed. The skis broke through the ice, and the aircraft sank until the wings settled on the ice surface. The pilot had the carburettor heat on during the landing. He did not determine why the engine missed.

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Aviation Occurrence Reports

STINSON 108-3 VOYAGEUR C-FNXO
TROIS-RIVIÈRES AIRPORT, QUÉBEC
14 DECEMBER 1985

REPORT NUMBER: 85-Q50071 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1330 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	244	8
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot of the ski-equipped aircraft attempted to take off into a 30-knot head wind from a 950-foot-long snow-covered surface. The pilot was unable to achieve lift-off, and, after a take-off run of 1,075 feet, the aircraft struck a four-foot-high snowbank and came to rest nose down, 30 feet beyond the snowbank.

The pilot elected to take off from this area which was normally used as a taxiway, because the aircraft would be directly into wind. The snow-covered surface was generally compact, although some portions of it were covered with approximately eight inches of light fluffy snow.

The pilot had not received any special training with respect to ski-equipped tail wheel aircraft, and this was the pilot's first take-off attempt in an aircraft of this configuration. The pilot reported that the indicated airspeed was 50 knots when the aircraft struck the snowbank. Given that the head wind component was 30 knots, the ground speed was therefore 20 knots.

In a no-wind condition, this aircraft would require 350 feet of runway for take-off. As the aircraft's ground speed was only 20 knots, significantly less distance should have been necessary to lift off successfully.

An examination of the tracks made by the aircraft skis in the snow confirmed that the skis were in contact with the ground throughout the take-off attempt. The aircraft was in a nose-high attitude at impact, and the heels of the skis were still in contact with the snow.

There was no indication of an engine malfunction, and the throttle was fully open throughout the attempt. The aircraft weight and balance were within limits.

The control inputs made by the pilot kept the aircraft in a nose-high attitude with the tail ski in contact with the ground throughout the take-off run. The normal take-off technique for a tail-ski-configured aircraft requires the pilot to allow the tail to become airborne so that the aircraft attitude and thus the wings are at a suitable angle of attack to produce the lift necessary for lift-off. Failure to raise the tail results in increased aerodynamic drag that can prevent the necessary lift development required for lift-off. The pilot did not reject the take-off when it became apparent that the aircraft was not going to lift off.

FINDINGS:

Cause Related:

1. The pilot was not adequately trained with respect to ski-equipped tail wheel aircraft.
2. The pilot did not use the appropriate take-off technique for an aircraft of this configuration.
3. The pilot did not reject the take-off when it became apparent that there was insufficient area in which to take off.

Other:

-Nil-

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GOVERNMENT OF THE PROVINCE OF
ALBERTA

CESSNA 337G C-GFSC
ST. PAUL, ALBERTA 9 mi S
6 NOVEMBER 1983

REPORT NUMBER: 83-W34079 (Incident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0355 MST
OPERATION: State
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	12,000	23
LAST 90 DAYS	150	23

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot had completed a night game patrol flight and was returning to St. Paul, Alberta when the rear engine suddenly lost power. A Fish and Wildlife Officer occupying the front right seat directed the pilot towards a highway by using his night vision goggles (NVG). The front engine then lost power necessitating an immediate forced landing. Because of the moonless night, the pilot was unable to make visual contact with the ground. The passenger, however, could see the highway clearly through the goggles and was able to direct the pilot for a landing as the aircraft lost altitude. At a height of approximately 100 to 150 feet, the landing lights illuminated the white centre line on the highway, and a safe landing was made.

The aircraft had commenced the flight from Edmonton with a full fuel load of 873 pounds of usable fuel. Three passengers were picked up at St. Paul, and the first patrol terminated at Lac La Biche two and one-half hours later. The next patrol lasted three hours, after which the pilot set a heading for St. Paul. The aircraft was within twenty miles of its destination when the first power loss occurred. Total airborne time from departure from Edmonton was 6 hours and 46 minutes. The pilot departed Edmonton knowing that the fuel gauges were not reliable.

During the flights, the pilot used a cruise power setting of 20 inches of manifold pressure and 2250 rpm. He then leaned the mixtures to obtain the maximum rise in exhaust gas temperature and then enriched the mixtures to obtain a 50-degree drop. The resultant total fuel flow indicated was 115 pounds per hour. The pilot estimated that the aircraft should have a total endurance of 7 hours

and 30 minutes including the three take-offs and climbs to altitude. At this consumption rate, a full fuel load of 873 pounds of usable fuel would give a cruise endurance of 7 hours and 36 minutes. However, the three take-offs and climbs would require an additional 90 pounds of fuel, thus reducing the endurance to 6 hours and 48 minutes. These figures tally with the 6 hours and 46 minutes flown by the aircraft.

Cruise performance charts for the Cessna 337 give a total fuel flow of 81 pounds per hour for the same power setting of 2250 rpm and 20 inches of manifold pressure, provided that the mixtures are leaned to peak exhaust gas temperature and not enriched afterward. This fuel flow would have been 31 pounds per hour lower than what was actually obtained.

The pilot had 23 hours flying time on this type of aircraft including a one-hour check ride. He had received less than one hour ground training on the aircraft.

The aircraft ran out of fuel short of its destination because the pilot miscalculated the total endurance by not allowing enough fuel for the three take-offs and climbs to altitude. The pilot did not obtain the consumption indicated in the performance charts for the power setting he used because he did not use the proper leaning procedure. Because of the pilot's limited training on this aircraft type, the pilot was not familiar with the performance of the aircraft and with the proper mixture leaning procedures.

FINDINGS:

Cause Related:

1. The pilot miscalculated the total endurance by not allowing enough fuel for the three take-offs and climbs to altitude; as a result, the aircraft ran out of fuel.
2. The pilot did not use the proper mixture leaning procedure as outlined in the pilot's operating handbook.
3. Because of the limited training he had had on the aircraft type, the pilot was not familiar with the performance of the aircraft and with the proper mixture leaning procedures.

Other:

-Nil-

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Aviation Occurrence Reports

RISK OF COLLISION BETWEEN: GRUMMAN
TRACKER 12195 and PA-38 TOMAHAWK
C-GRVK

MONCTON, NEW BRUNSWICK

10 DECEMBER 1984

LOCAL TIME: 1606 AST

INFORMATION SOURCE: Field Investigation

GRUMMAN TRACKER 12195

REPORT NUMBER: 84-A44051 (Incident)

OPERATOR: Canadian Armed Forces

OPERATION: None

DAMAGE: None

PILOT LICENCE: Not Applicable

	PILOT-IN-COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL HOURS:	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

PA-38 TOMAHAWK C-GRVK

REPORT NUMBER: 84-A44051 (Incident)

OPERATOR: Moncton Flying Club

OPERATION: Flying Club Training

DAMAGE: None

PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	500	150
LAST 90 DAYS	80	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The Tracker aircraft was on an instrument flight rules (IFR) flight plan and had just received a clearance to conduct a full procedure backcourse instrument landing system (ILS) approach to runway 11 at Moncton, New Brunswick. A PA-38 with an instructor and prospective student on board was on a familiarization flight over the city of Moncton. This flight was operating under visual flight rules (VFR) and was given a restriction to remain

north of the Trans-Canada Highway, which would keep the aircraft clear of the approach to runway 11.

The Moncton tower controller attempted to contact the pilot of the PA-38 when he observed the aircraft on radar tracking south from the expected area of operation toward the approach path of runway 11. The tower controller was unable to contact the PA-38 but was able to warn the Tracker crew who spotted the aircraft as it passed approximately 50 feet overhead the Tracker. No evasive action was taken by either aircraft.

Prior to take-off, the PA-38 was given a restriction which would have provided separation from the Tracker. When the tower controller observed that the PA-38 was not complying with the restriction, he attempted to contact the aircraft. However, the instructor had inadvertently reduced the radio volume in the aircraft to the point that he was unable to hear the radio. While the instructor was busy pointing out various aspects of flying to the prospective student, he allowed his flight path to cross the highway and infringe upon the approach path of an active IFR runway.

FINDINGS:

Cause Related:

1. The pilot of the PA-38 did not comply with an air traffic control restriction and crossed the approach path of an active IFR runway.

2. The radio volume in the PA-38 was reduced so that communication with the aircraft was not possible.

Other:

-Nil-

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RISK OF COLLISION BETWEEN: MCDONNELL
DOUGLAS CF-188 118727 and AIRFIELD
MAINTENANCE TRUCK
YELLOWKNIFE, NORTHWEST TERRITORIES
03 FEBRUARY 1985
LOCAL TIME: 1101 MST
INFORMATION SOURCE: Field Investigation

MCDONNELL DOUGLAS CF-188 118727

REPORT NUMBER: 85-W54009 (Incident)
OPERATOR: Department of National Defence
OPERATION: State
DAMAGE: Nil
PILOT LICENCE: Not Required

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

MAINTENANCE TRUCK

REPORT NUMBER: 85-W54009 (Incident)
OPERATOR: Department of Transport
OPERATION: Airfield Maintenance
DAMAGE: Nil

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft was accelerating through 130 knots during the take-off run from runway 15, when the pilot observed a truck west of the centre line on the runway ahead. Because of his high speed and the length of the runway remaining, the pilot elected to continue the take-off. The aircraft passed 50 feet to the east of and 75 feet over the truck.

PERTINENT INFORMATION:

The weather at the time of the incident was sky partially obscured, estimated 3,000 feet overcast ceiling, visibility five-eighths of a mile in light snow, wind 160 degrees true at six knots, and temperature minus 26 degrees Celsius.

The runway is hard surfaced and 7,500 feet long and 150 feet wide. At 1753 MST, the tower controller, who was acting as both ground and tower controller because of the low volume of traffic, cleared the truck (Staff 22) onto runway 15/33 unrestricted to check runway conditions and braking action. While on the runway, the truck headlights and rotating beacon were on. At 1800 MST, the aircraft was cleared for take-off on runway 15. The truck was heading north, about 25 feet west of the runway centre line, when the driver saw the aircraft lights approaching. He turned west and was about 25 feet from the edge of the runway and 5,700 feet from the threshold when the aircraft passed him.

At the time that the truck was cleared onto the runway, the controller placed a Runway Obstruction Display System (RODS) strip prominently on the control console to remind the controller(s) that the runway was closed. During the next few minutes, while the controller was receiving and passing information and clearances to the departing CF-188, he saw a half-ton truck exit the airport manoeuvring area, and, assuming that it was Staff 22 and that the runway was now clear, he removed the RODS strip. It was after the strip was removed that the controller cleared the CF-188 for take-off. Between the time the truck driver had been cleared onto the runway and the time of the incident, there had been no communications between him and the controller.

Yellowknife Control Tower, Operations Letter 83-7, outlines controller actions regarding the use of airport manoeuvring areas during periods of reduced visibility. A controller "must ensure that those manoeuvring areas in use are actually clear of aircraft and vehicles before permitting aircraft to land or take off. One or both of the following procedures shall be used, whichever is most suitable;

1. By visually checking that the aircraft or vehicle is well clear of the manoeuvring areas; or
2. By having the pilot/operator confirm by radio that his aircraft/vehicle is clear of the runway by at least 150 feet."

The controller's assumption that the truck he saw exit the manoeuvring area was the truck (Staff 22) that he had cleared onto the runway was based on the following: Staff 22 was the only vehicle authorized to be on the manoeuvring area; the truck exited the manoeuvring area where Staff 22 would have exited; and the time between entry and exit of the truck would fit the time frame for a runway check.

The Department of National Defence (DND) had been operating on the airport for some time and occasionally DND drivers had been observed driving on airport manoeuvring areas without the required tower controller

approval. The tower controller above was aware of this activity and had talked to DND personnel about the problem.

ANALYSIS:

The truck driver and the aircraft pilot both operated as cleared by the controller. The reduced visibility prevented the pilot from seeing the truck until he was past the point where he could have safely rejected the take-off.

The controller thought that the runway was clear because he saw a truck exit the manoeuvring area. Had the controller been positive that the truck he saw was Staff 22, then it could be stated that he applied paragraph 1 of Operations Letter 83-7 in "ensuring that those manoeuvring areas in use are actually clear...." That is, he visually checked that the vehicle was well clear of the manoeuvring areas. However, he was not positive; he used three related facts to conclude that the truck he saw was Staff 22. As well, he was aware that vehicles had been using the manoeuvring areas without controller prior knowledge or approval, which should have alerted the controller to be particularly cautious regarding ground vehicles on airport property.

FINDINGS:

Cause Related:

1. Ground visibility was restricted because of snow.
2. The tower controller did not ensure that the runway was clear of traffic before he issued take-off clearance to the aircraft.

Other:

1. Vehicles were being driven on the airport manoeuvring areas without prior approval.

SAFETY ACTION:

Action Taken:

The Department of National Defence has confirmed that orders are in place restricting unapproved vehicle traffic on the Yellowknife Airport manoeuvring area and that visiting Canadian Forces detachments are advised of these restrictions during their "In" briefing.

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RISK OF COLLISION BETWEEN: BEECH 200 C-GFSB and VEHICLE SNOW-BLOWER EDMONTON INTERNATIONAL AIRPORT, ALBERTA

06 MARCH 1985

LOCAL TIME: 1437 MST

INFORMATION SOURCE: FIELD INVESTIGATION

BEECH 200 C-GFSB

REPORT NUMBER: 85-W54027 (Incident)

OPERATOR: Province of Alberta

OPERATION: State

DAMAGE: None

PILOT LICENCE: Airline Transport

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
PILOT HOURS:				
TOTAL	Unknown	Unknown	Unknown	Unknown
LAST 90 DAYS	Unknown	Unknown	Unknown	Unknown
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	3	
PASSENGERS	-	-	-	

SNOW-BLOWER

REPORT NUMBER: 85-W54027 (Incident)

OPERATOR: Department of Transport

OPERATION: Snow Removal

DAMAGE: None

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The crew of the Beech 200 had completed a simulated instrument approach to runway 29 under visual meteorological conditions and was circling to land on runway 11. The flight was cleared to land and at approximately 200 feet above ground level and 1 1/2 miles from the threshold of runway 11, the pilot flying noticed a snow-blower enter the runway and proceed down the runway. The tower was advised as an overshoot was carried out. The tower then instructed the snow-blower operator to promptly vacate the runway, which he did, and the aircraft landed without further incident.

The snow-blower operator had requested to proceed down runway 11 but the ground controller authorized him to proceed down taxiway Alpha. Upon hearing the word "proceed" the snow-blower operator drove onto the runway.

The air traffic controllers were looking in a northwesterly direction, with their backs to taxiway Alpha and runway 11. They did not see the vehicle pull onto the runway and were not aware of it until advised by the pilot of the landing aircraft. The ground controller, having authorized the snow-blower operator to proceed on Alpha, did not check visually to see if the snow-blower was proceeding down Alpha.

There was construction on taxiway Alpha and although there was a snow road around the construction area the snow-blower operator did not want to use the road because the snow-blower may have become stuck. Because of this, the snow-blower operator was mentally prepared to proceed down runway 11.

FINDINGS:

Cause Related:

1. The snow-blower operator proceeded onto runway 11 when he had been authorized to proceed down taxiway Alpha.
2. The ground controller did not visually check to see if the snow-blower had followed his instructions.
3. The air traffic controller did not detect the intrusion of the snow-blower onto the runway.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

In its Report on a Special Investigation into the Risk of Collision Involving Aircraft On or Near the Ground (August 1987), the Canadian Aviation Safety Board determined that vigilance and other human factors were key to collision avoidance. Since these human performance variables are not well understood, it was recommended that

The Department of Transport initiate a multi-disciplinary study into the most effective means for sustaining vigilance, particularly for air traffic controllers under periods of low activity rates; and

(CASB 87-41)

The Department of Transport undertake a multi-disciplinary review of all the human performance variables, including those related to the information transfer process, which may compromise the effectiveness of ATS personnel, of vehicle operators, and of pilots during the ground phases of operations.

(CASB 87-42)

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ROYAL CANADIAN MOUNTED POLICE
DE HAVILLAND DHC3 C-FEBX
MARY'S HARBOUR, NEWFOUNDLAND
11 APRIL 1985

REPORT NUMBER: 85-A50005 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 1545 NST

OPERATION: State

DAMAGE: Substantial

PILOT LICENCE: Senior Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,074	1,220
LAST 90 DAYS	Unknown	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was attempting a take-off in a 10-knot, 60-degree left cross-wind. As the tail lifted off the ground, the aircraft veered sharply to the left. The pilot applied brake and opposite rudder to regain directional control but was unsuccessful. He then closed the throttle in an attempt to prevent the aircraft from leaving the runway. However, the aircraft rode up onto a snow bank at the edge of the runway, damaging the right wing and stabilizer.

On this aircraft, propeller torque, particularly during take-off, tends to swing the aircraft to the left. This swinging tendency, in combination with the left cross-wind, resulted in the sudden veer which the pilot was unable to correct with directional control input.

FINDINGS:

Caused Related:

1. Directional control was not maintained during the cross-wind take-off.

Aviation Occurrence Reports

Other:

- Nil -

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GOVERNMENT OF NEWFOUNDLAND AND
LABRADOR

CANADIAN VICKERS LTD PBY-50 CANSO
C-FOFI

GOOSE BAY, LABRADOR 15 mi N

30 JUNE 1985

REPORT NUMBER: 85-A50016 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1235 LST

OPERATION: State

DAMAGE: Substantial

PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,000	475
LAST 90 DAYS	87	32

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was dispatched to engage in water bombing at the site of a large forest fire. After completing one successful water pick-up from an open bay, the aircraft was directed to a lake closer to the fire. During the water pick-up, the pilot rejected the take-off, and the aircraft porpoised and came to a stop. The crew shut down the engines but decided to restart them to beach the aircraft. When the aircraft started to move forward, it began to fill with water through a hole in the forward hull. The engines were shut down, and the aircraft sank. The two crew members escaped through the cockpit overhead escape hatches.

The lake was surrounded by hills and had a dog-leg to the left. There was a gusty cross-wind from the right producing about a one-foot chop. After take-off, the water bombers were turning left to stay over water in order to avoid having to climb over the hills at the shoreline.

This aircraft was a different Canso than the one normally flown by this crew. It had slightly different handling and performance characteristics. On the water, the aircraft was nose heavy and had a tendency to turn right.

The crew was planning to turn left after the water pick-up to follow the lake. The take-off run used more of the available space than they expected, and the crew attempted to turn left while still on the water, but the aircraft would not turn. The particular characteristics of this aircraft and the cross-wind from the left contributed to the inability of the crew to turn the aircraft on the water.

When the aircraft would not turn, the pilot elected to reject the take-off, and the aircraft began to porpoise. Reducing power would tend to pitch the nose up, and this, together with the wind and wave conditions, led to the porpoise. Although the crew had been briefed on the procedure to recover from a porpoise, they did not take effective recovery action. The porpoise oscillations increased in intensity until the aircraft sustained hull damage.

The Canso is a World War II vintage aircraft which has been modified as a water bomber. Each Canso used by the operator had different handling characteristics of varying degree. The crew was experienced but normally flew the same aircraft. When assigned to this aircraft, they were not briefed on its characteristics.

FINDINGS:

Cause Related:

1. The crew was not familiar with the different performance and handling characteristics of this aircraft.
2. During the water pick-up, the aircraft used more of the available distance than the crew anticipated.
3. Because of the aircraft characteristics on the water and a cross-wind from the right, the crew was unable to turn the aircraft to the left to follow the contour of the lake.
4. The crew elected to reject the take-off because of steeply rising terrain straight ahead.
5. During the rejected take-off procedure, the aircraft entered a porpoise from which the crew was unable to recover.

Other:

-Nil-

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DEPARTMENT OF TRANSPORT,
GOVERNMENT OF CANADA
BEECHCRAFT 65-90 KING AIR
C-FCAU
LACHUTE AIRPORT, QUÉBEC 2 mi W
29 AUGUST 1985
REPORT NUMBER 85- H50004

PILOT HOURS:	PILOT	CO-PILOT		ON
	ALL TYPES	ON TYPE	ALL TYPES	
TOTAL	10,200	43	10,436	38
LAST 90 DAYS	12	4	3	3
INJURIES:				
CREW	FATAL	SERIOUS	MINOR/NONE	
PASSENGERS	-	-	2	

HISTORY OF THE FLIGHT:

On 29 August 1985, a Beechcraft 65-90, King-Air, C-FCAU, owned and operated by the Department of Transport, Government of Canada, was on an instrument flight rules (IFR) training flight from Ottawa, Ontario to Quebec City, Quebec and return. On board were two crew members. For flight planning purposes, the crew used a standard training flight fuel load of 2,000 pounds.

The flight departed from Ottawa Airport at 1341 eastern daylight time (EDT) and proceeded to Quebec City at 15,000 feet above sea level (ASL). A full-stop landing was completed at Quebec City Airport on runway 06 at 1445. After a brief stop to allow the crew to switch seats and complete the before-take-off checks, the aircraft departed Quebec City Airport at 1451 and climbed to 14,000 feet asl en route to Ottawa. The pilot-in-command was in the left seat and at the controls.

At 1541, while in cruise at 14,000 feet asl, the right boost pump light illuminated followed by the stand-by boost pump light. The right engine fuel pressure dropped to zero, and the right engine began to lose power. As engine rpm decreased, the crew opened the fuel cross-feed valve, and engine rpm and power were re-established.

At 1541:30, the co-pilot requested an air traffic control (ATC) clearance for an immediate descent to the Mirabel Airport. While the pilot-in-command followed the instruction from ATC, the co-pilot read the section of the Beech 65-90 Pilot's Operating Manual describing the fuel system. At 1543, while descending through 11,000 feet asl, both engines flamed out. The co-pilot then declared an emergency. During the descent, the left

engine restarted itself twice and the right engine once. In each case, full power was reached for a short period of time before the engine flamed out again.

At 1544, ATC informed the crew that the Lachute Airport was at their 12 o'clock position at eight miles. At this time, the aircraft was descending through 8,500 feet asl, and the crew of C-FCAU confirmed that the Lachute Airport was in sight. At 1545, as the aircraft descended through 5,500 feet asl, the crew informed ATC that they were planning to carry out a landing on runway 10 at Lachute Airport.

Shortly thereafter, the crew realised that they would not be able to reach the Lachute Airport, and the pilot-in-command selected a farm field in which to carry out a forced landing. C-FCAU landed on the field with the flaps and landing gear still retracted and both propellers windmilling. Both crew escaped uninjured.

The accident occurred at 1547 during the hours of daylight, two nautical miles west of the Lachute Airport in a grass field situated at lat 45 deg. 38 min. N, long 74 deg 25 min W.

ANALYSIS

The aircraft departed Ottawa with approximately 700 pounds less fuel than recorded in the aircraft journey log book. The double-engine flame-out occurred as a result of fuel starvation. Fuel was available in the wing tanks; however, without activation of the fuel transfer pumps, it was unusable.

CONCLUSIONS

Cause-Related Findings

1. The maintenance procedures for monitoring and recording the aircraft fuel state were inadequate.
2. The pre-flight daily inspection performed by maintenance personnel did not establish and accurately record the fuel state of the aircraft.
3. The aircraft departed Ottawa with 700 pounds less fuel than the fuel quantity recorded in the journey log.
4. The crew's surveillance and monitoring of the aircraft fuel quantity was such that they did not detect, either before or during the flight, the discrepancy between the amount of fuel recorded in the aircraft journey log book and the amount of fuel on board the aircraft.
5. Both engines flamed out in flight because of fuel starvation, while approximately 350 pounds of fuel was available.

Aviation Occurrence Reports

6. Neither the pilot-in-command nor the co-pilot was fully conversant with the operation of the aircraft fuel system to make effective use of the available fuel.
7. Crew training performed by the Department of Transport did not adequately cover all aspects of the automatic fuel transfer system.
8. Inconsistencies between the Pilot's Operating Manual and the Pilot's Check-List existed with respect to fuel quantity checks.
9. The procedure to activate the transfer test switch during the before-take-off checks was not included in the Operating Manual Normal Procedures or the Pilot's Check-List.
10. Both the pilot-in-command and the co-pilot had limited experience on type.
11. The published emergency procedures were not followed by the crew when both engines failed, resulting in a degradation of the glide performance of the aircraft.

Other Findings

1. The aircraft was not equipped with an independent low-fuel-level warning system, nor was one required by regulations.
2. There was no minimal time on type required to act as pilot-in-command.
3. The crew of the Beech 65-90 was certified and qualified for the flight in accordance with existing regulations.
4. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.
5. There was no evidence found of any airframe failure or system malfunction prior to or during the flight.
6. The weight and centre of gravity were within the prescribed limits.

SAFETY ACTION

Action Taken

1. Transport Canada Flight Services' Procedures for Control of Aircraft Fuel States

On 5 September 1985, Transport Canada (TC) amended the department's refuelling procedures. The journey log must now accurately reflect both the fuel which has been added to the aircraft and the total fuel on board the aircraft, taking into account any maintenance activity

which could change the fuel state. Daily aircraft inspection sheets have been amended to include a detailed fuel check. The Board is satisfied that these measures rectify the deficiency which existed at the time of the accident in the procedures for determining and logging the fuel status of Department of Transport operated aircraft.

2. Department of Transport Groundschool and In-flight Procedures

Groundschool syllabi and the contents of in-flight check-lists for all TC operated aircraft were under review by TC at the time of the accident. Groundschool recurrency sessions now emphasize the importance of fuel management, and aircraft check-lists now contain appropriate fuel system checks.

3. Fuel Transfer System: BE 65-90 Aircraft

The circumstances of the accident flight point to a deficiency in the operation of the fuel transfer system of the BE 65-90 aircraft, whereby the fuel transfer pump switches can be selected on, but the pumps will not be activated. However, immediately after the accident, a review of accident data for the aircraft type failed to indicate that this deficiency had contributed to any recorded occurrences in Canada or the United States. Furthermore, since a similar design had not been incorporated in other Beechcraft aircraft, the Board believed that the effects of the deficiency could be ameliorated by expanding and highlighting pilot information on the operation of the fuel transfer system, by changing pilot operating procedures, and by changing the cockpit placard for the transfer test switch. Accordingly, two recommendations were issued to the Minister of Transport on 4 December 1985. The CASB recommended that:

The Department of Transport take the necessary action to have the Pilot's Operating Manual and check-lists for the Beechcraft KING AIR (65-90) amended to include the following:

- a. in Section II, an explanation of the operation of the automatic fuel transfer system, and a "Warning" on the requirements for and action required to ensure automatic fuel transfer;
- b. in Section XI, the highlighting by a "Warning" the importance of correct tank sequencing in the fuelling of the aircraft;
- c. a check-list item in the Before-Take-Off Check, in which the pilot selects the Transfer Test Switch to the "Left" and "Right" in a manner similar to the procedure currently described in the "Unusual Operation" sub-section of the Fuel System section; and

d. in the Emergency Section, an appropriately placed entry requiring the pilot to select the "Transfer Test" switch to the "Left" and "Right" positions after a single- or double-engine failure.

CASB 85-14

The Department of Transport ensure that the "Transfer Test" switch in the cockpit of all Beechcraft KING AIR (65-90) aircraft is placarded to more accurately reflect the dual function of this switch.

CASB 85-15

In the Minister's response of 24 February 1986, the Department agreed in principle with the CASB recommendations but considered that there was insufficient justification to recommend formal amendments to the Pilot's Operating Manual. Alternatively, TC issued a notice to all BE-65-90 owners and operators in Canada, giving details of the accident and recommending additions to Section II of the Pilot's Operating Manual and the check-list. Compliance with the substance of the letter was not mandatory; however, the CASB has since contacted several Canadian operators of BE 65-90 aircraft and determined that appropriate action has been taken.

Accordingly, the Board is satisfied that the measures undertaken by TC as a consequence of Recommendations CASB 85-14 and 85-15 adequately address the deficiency of the fuel transfer system of BE 65-90 aircraft operating in Canada at this time.

The CASB understands that since the issue of Recommendations CASB 85-14 and 85-15, and after a fuel-related accident involving an American registered BE 65-90 in the United States, the aircraft manufacturer intends to amend the pre-flight procedures to require the selection of the transfer test switch to the "Left" and "Right" position. In the interim, the manufacturer issued in November 1986 "King Air 90/100 Communique No. 7" which emphasized fuel transfer system operating characteristics and procedures. The Board believes that the measures taken by the aircraft manufacturer will assist in the prevention of similar accidents involving this aircraft type.

Further Action Required

1. Inadequate Qualifications Standards for Pilot-In-Command, Department of Transport Flight Crew

The absence of a provision within the TC Flight Operations Manual (FOM) for a minimal number of flight hours on aircraft type differs from safety-related restrictions in commercial operations. There are direct and indirect means of influencing safe-operating practices in the aviation industry. Aviation companies apply to the Department of Transport for an Operating Certificate

and must adhere to conditions therein which are designed to safeguard company operations. Aviation companies also apply to insurance companies for insurance protection on company aircraft and must adhere to subsequent conditions which are designed to minimize the risk, thereby indirectly enhancing the safety of the operation. A common condition in commercial aircraft insurance policies is requirement for flight crew to acquire a minimum of experience on a specific aircraft type before upgrading to a pilot-in-command.

The Board believes that the absence of a minimal level of experience on aircraft type beyond initial type training for a TC pilot-in-command degrades the safety of TC flight operations. Accordingly, the CASB recommends that:

The Department of Transport establish, by aircraft type, minimal levels of experience on type for upgrading Transport Canada flight crew to the position of pilot-in-command.

CASB 87-11

Safety Concerns

1. The Safety of TC Flight Operations

The Board is concerned by the deficiencies identified in this accident. Recognizing the complexity of the flight operations, a review of all accidents involving Department of Transport aircraft over the past decade has been undertaken. Among other things, this study will address pilot proficiency and recurrency training requirements. The Board will consider the need for further recommendations upon completion of this study.

2. Inadequate Cockpit Indications of a Fuel Low-Level State

Fuel exhaustion and fuel starvation have contributed to 378 accidents since 1976, or approximately 5 per cent of reported accidents. While the causes of such accidents range from inadequately designed fuel gauges to inadequate flight planning procedures or to complacency in in-flight fuel monitoring, the Board believes that many of these accidents could be prevented if all aircraft were equipped with an independent, low-level fuel sensor and indicator. The Board is continuing to monitor occurrences deriving from fuel exhaustion or starvation; recommendations for safety action will be made if appropriate.

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Aviation Occurrence Reports

ROYAL CANADIAN MOUNTED POLICE
BEECH 65A90 KING AIR C-FVMH
MONCTON AIRPORT, NEW BRUNSWICK
07 OCTOBER 1985

REPORT NUMBER: 85-H50006 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1250 ADT
OPERATION: State
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

	PILOT-IN-COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	4,150	550	2,100	450
LAST 90 DAYS	65	65	80	34
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	2	
PASSENGERS	-	-	4	

HISTORY OF THE FLIGHT:

The flight was being conducted by the Royal Canadian Mounted Police (RCMP), Ottawa Air Detachment, to transfer two federal prisoners from Dorchester Penitentiary, New Brunswick to Kingston, Ontario.

Shortly after the aircraft took off from the Moncton Airport, the tower air traffic controller informed the crew that the left main wheel had fallen off. After a brief discussion, during which they confirmed that only the left main wheel had been lost, the crew decided to divert to Ottawa International Airport, because it was the aircraft's home base and had the emergency and recovery services required.

While en route to Ottawa, the crew was in contact with the Ottawa detachment, and preparations were made for a wheels-up landing on the grass parallel to and south of runway 25. The landing procedures were discussed, the passengers were briefed, and response organizations were alerted.

On arrival at Ottawa, the aircraft made two low passes over the landing area, then held north of the airport to burn off fuel. When the fuel load was reduced to the point that only the nacelle tanks contained fuel, the aircraft was returned for the landing. The final approach was flown with the flaps selected at 80 per cent and at an indicated airspeed of 92 knots, which was the minimum safe airspeed should an engine fail. The crew turned off the non-essential electrics, including the radios, and the passengers braced for the landing. Just prior to touchdown, the co-pilot stopped the engines

using the condition levers, and the captain shut off the fuel and remaining electrics. The aircraft touched down smoothly on its belly and slid for 845 feet before coming to rest, heading 120 degrees left of the landing direction. The four passengers and two crew members then exited the aircraft in accordance with the pre-briefed procedure.

PERTINENT INFORMATION:

The left main wheel and most of the outer bearing were recovered at Moncton. The washer, retaining nut, cotter pin, and the remainder of the bearing were still on the aircraft when it landed at Ottawa. An examination of these items determined that the wheel bearing had failed, thus allowing the wheel to pass over the washer and retaining nut. The wheel, axle, and bearing showed signs of extreme heat. The bearing rollers had flat spots on them indicative of sliding or skidding. The bearing cup, identified as a Timken P/N07916, had gouged the wheel tube, and the inner surface of the bearing cup was fretted. A detailed failure analysis of the bearing was not conducted as bearing experts felt that a specific cause of the failure could not be determined. The correct grease had been used to lubricate the bearing.

The American Society for Metals Handbook, Volume 10, states that sliding or skidding damage may be a result of "excessive slippage of rolling elements caused by improper lubrication, light loading between rolling elements and their raceways or binding of rolling elements in the rotation." In this case, light loading or binding of the roller elements would normally be the result of incorrect torque on the retaining nut of the failed assembly. Damage to the wheel assembly was such that the torque on the retaining nut could not be established.

The aircraft had undergone an overhaul inspection in the RCMP's facility at Ottawa prior to its departure for Moncton. The left main wheel and bearings had been replaced at that time. The outer bearing used was not a "serialized" or "service-lifed" item. This type of bearing is only disposed of when found to be unserviceable, and, as a result, its age could not be determined. The bearing, along with the wheel, had been removed for maintenance during a previous inspection. Both were inspected, serviced, and then held in a secure storage area until they were reinstalled. When the wheel and bearing were reinstalled on the aircraft, they were held in place by a washer and a retaining nut which is locked in position by a cotter pin. The nut used was the same retaining nut used prior to the inspection. A torque wrench was not used to set the required torque. The prescribed maintenance manual procedures for installing the main wheel require that the retaining nut be torqued to 150 to 200 inch-pounds in order to set the assembly in place. The nut is then backed off and retorqued to 40 inch-pounds.

If at 40 inch-pounds the cotter pin holes do not line up, the torque is increased until the cotter pin can be inserted.

The crew did not observe any abnormalities during the pre-flight inspections or the two flights made prior to the loss of the main wheel.

ANALYSIS:

The left main wheel was lost because the outer wheel bearing failed. It was not feasible to determine the precise cause of the bearing failure. However, it is likely that the retaining nut was not correctly torqued when the wheel was installed during the overhaul inspection.

The following laboratory reports were completed: LP 227/85 - Main Wheel Failure, Beech King Air 65A90, C-FVMH; LP 234/85 - Photo/Video Documentation, Beech King Air 65A90, C-FVMH, Ottawa International Airport, Ottawa, Ontario; and LP 235/85 - Site Survey Beechcraft 65A90, C-FVMH, Ottawa International Airport, Ottawa, Ontario.

FINDINGS:

Cause Related:

1. The left main wheel fell off on take-off because the outer wheel bearing failed for undetermined reasons.

Other:

1. A torque wrench was not used to set the torque on the retaining nut; the maintenance manual procedures specify the use of a torque wrench.

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PROVINCE OF MANITOBA
PIPER PA-23-250 AZTEC C-FMAD
ROBLIN, MANITOBA
07 NOVEMBER 1985

REPORT NUMBER: 85-C50091 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1400 CST
OPERATION: State
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	12,000	125
LAST 90 DAYS	90	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

HISTORY OF THE FLIGHT:

The aircraft arrived at the Roblin Airport Manitoba, following a 30-minute visual flight rules (VFR) flight from Swan River, Manitoba. The pilot circled the area to assess the runway surface and weather conditions before joining the circuit to land on runway 26.

The aircraft was landed parallel to the runway but 675 feet left of it in a ploughed field. Moments after touch-down, the nose gear failed.

PERTINENT INFORMATION:

The Roblin Airport Commission operates the airstrip which has a public licence. The 3,000-foot turf runway has runway markers along each side and a wind sock north of the runway. There are red marker balls on the power line which runs perpendicular across the approach to runway 26. The runway and surrounding area, including the runway markers, were lightly snow covered.

Wheat fields border the strip to the north and south. There are no radio aids to navigation at the airport.

A moderate northwesterly flow of fairly moist stable air prevailed over the Roblin area, resulting in ceilings of 2,000 to 3,000 feet above ground level. Although no restriction to visibility was forecast, local visibilities may have been reduced to one to two miles in snow showers.

Aviation Occurrence Reports

ANALYSIS:

Although the pilot had no difficulty locating the airport, the surrounding area, including the runway, was snow covered. Runway markers were not visible from the air, and, even though the power line was seen, the pilot did not see the red marker balls.

While circling the airport, the pilot picked out what he thought was the runway. Despite the fact that the length looked shorter than the 3,000 feet depicted on the chart, he commenced the approach. Once the decision to land in the selected area was made, the pilot concentrated on maintaining visual contact. The contrast between the runway and the surrounding terrain was poor due to a recent snow fall.

FINDINGS:

Cause Related:

1. The pilot landed in an unsuitable area 675 feet south of the runway.

Other:

-Nil-

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ALPINE HELICOPTERS

BELL 412 C-GAHW

REVELSTOKE, BRITISH COLUMBIA

15 JUNE 1984

REPORT NUMBER: 84-P44009 (Incident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 1058 PDT

OPERATION: Commercial Non-Revenue

DAMAGE: Minor

PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,300	.5
LAST 90 DAYS	Unknown	.5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The helicopter took off from Revelstoke Airport and was climbing en route for Edson, when the pilot heard a loud bang. The helicopter then rolled violently and lost altitude. The pilot immediately carried out an autorota-

tion and performed a successful landing on a sand bar in the Columbia River.

The male coupling teeth of the forward end of the engine-to-transmission drive shaft had failed. The forward coupling displayed evidence of a lack of lubrication. The helicopter had flown 1 hour and 20 minutes since a 600-hour inspection. During such an inspection, the drive shaft is removed, inspected, repacked with grease, and reinstalled. This inspection also involves the installation of a new packing in a groove of each boot, and the boot is bolted on the coupling. The condition of the packing could not be determined after the occurrence because of damage due to overheating.

The cause of the loss of lubricant could not be determined. However, a few months after this occurrence, it was discovered that a Bell 212 main drive shaft assembly had sprayed grease on the firewall of the drive shaft tunnel. The Bell 212 drive shaft is almost identical to the 412's. Upon disassembly, the grease was found to be escaping from a pinched packing located between the outer coupling and the drive shaft boot. It appeared that, at the time of assembly, the packing had become dislodged from its groove when the boot was being bolted to the outer coupling.

Laboratory analysis of the grease from the transmission revealed that this grease met the basic requirements of those outlined in the manufacturer's specifications. It was also discovered that the engine transmission mounts were unserviceable because of spring rates below the minimum required and because of deteriorated elastomeric material. However, it was determined that this unserviceability was not associated with the coupling failure.

The following laboratory reports were completed: LP 216/84 and LP 235/84 - Analysis of Grease Samples - Bell Helicopter Specifications; LP 234/84 - Transmission Mounts Examination for Spring Rates.

FINDINGS:

Cause Related:

1. The lubricant escaped from the engine-to-transmission drive shaft for undetermined reasons.

2. Because of the lack of lubricant, the male coupling teeth of the forward end of the engine-to-transmission drive shaft failed, forcing the pilot to perform an emergency autorotative landing.

Other:

1. All the transmission mounts were unserviceable because of spring rates below the minimum required and because of deteriorated elastomeric material.

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LAKELAND HELICOPTERS LIMITED
BELL 206B (Helicopter) C-GKGA
MARGARET LAKE AIRSTRIP, ALBERTA
04 AUGUST 1984

REPORT NUMBER: 84-W40054 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1600 MDT
OPERATION: Specialty Aerial Control
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	600	550
LAST 90 DAYS	46	46

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter, which was engaged in forest fire control duties, had landed at an airstrip to refuel. Refuelling was from 45-gallon fuel drums, and the pilot had landed close to the drums. After refuelling, as the helicopter entered a hover, the pilot heard a "beep" from either the engine out warning or the low rotor rpm warning system. As he glanced down at the instrument panel in an attempt to determine the reason for the beep, the helicopter drifted to the right, and the right skid gear came into contact with the fuel drums. Dynamic roll-over occurred, and the helicopter was substantially damaged.

The helicopter was in good mechanical condition and had no known unserviceabilities prior to the accident. An examination of the machine and its related systems failed to uncover any deficiencies that could have contributed to the accident. When both warning systems were bench tested, they functioned normally; no reason for the reported beep could be found. The helicopter was equipped with "high skid gear", a factor which would have enhanced the aircraft's susceptibility to dynamic roll-over, once the skids had struck the fuel drums.

The pilot was operating the helicopter in a demanding environment, and he had flown 23 hours in the previous three days. Conditions were such that it was very difficult to get proper rest. The heavy flying schedule, coupled with the lack of proper rest, left the pilot fatigued and reduced his alertness. The pilot did not notice the helicopter drifting to the right and could not react in time to take corrective action before the skids struck the fuel drums.

FINDINGS:

Cause Related:

1. The pilot was fatigued due to a heavy flying schedule and limited rest in the three days prior to the accident.
2. The pilot's attention was diverted to the instrument panel during the hover.
3. The helicopter's right skid gear was allowed to contact fuel drums, a condition which contributed to dynamic roll-over.

Other:

- Nil -

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QUEEN CHARLOTTE HELICOPTERS LTD.
HUGHES 369D (Helicopter) C-GQCH
FLETT AIRSTRIP, NORTHWEST TERRITORIES
09 AUGUST 1984

REPORT NUMBER: 84-W40059 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2145 MDT
OPERATION: Specialty Aerial Inspection, Reconnaissance and Advertising
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,500	400
LAST 90 DAYS	90	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot and three passengers were on a reconnaissance flight in mountainous terrain, in search of smouldering fires, and the pilot had descended to low level to inspect some lightning strike areas. The wind speed was 35 to 40 knots with gusts, which caused moderate to severe turbulence. The turbine engine (Allison 250-C20B) lost power while the helicopter was flying at 200 to 250 feet above ground level (agl) at a speed of about 40 knots. The pilot autorotated and headed, with the wind, toward the cleared but stump-ridden overrun area of a nearby airstrip. The main rotor rpm decreased, and tail rotor authority was lost as the helicopter reached the selected landing area. The helicopter touched down, the right skid struck a stump and broke, and the main rotor blades severed the tail boom.

Aviation Occurrence Reports

The compressor discharge pressure line (Pc line) from the Pc air filter to the compressor scroll failed at the air filter connection. The fuel to the engine is controlled by regulated air pressure, and the loss of air pressure would cause the engine to go to flight idle. Laboratory examination of the Pc airline revealed that this part failed because of high cycle fatigue. Fatigue initiated on the surface of the tube underneath the attachment nut sleeve in areas of corrosion pitting. Analysis of the corrosion by-products indicated exposure to a marine or industrial environment.

The power loss occurred at low altitude, at low airspeed, in moderate to severe turbulence, and over rough terrain, conditions that, when combined, virtually precluded the safe recovery of the helicopter once the engine went to flight idle. The tail wind on landing further aggravated the situation.

The following laboratory report was completed: LP 279/84 - Pc Line Failure - Hughes 500 D.

FINDINGS:

Cause Related:

1. The Pc airline failed in fatigue in areas weakened by corrosion pitting; as a result, air pressure was lost and the engine went to idle.

Other:

- Nil -

SAFETY ACTION:

Safety Action Taken:

Allison Gas Turbine Division Alert Commercial Engine Bulletin issued 23 June 1986 informed all 250 series engine operators of failures of the Pc scroll to Pc filter tube assembly (pn 6848471). This tube and associated fittings were to be inspected using a 10X magnifying glass no later than 31 July 1986, and thereafter on a periodic basis whenever the tube is removed during a compressor washing.

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LAKELAND HELICOPTERS LTD.
HUGHES 369D (Helicopter) C-GSRS
ROSS RIVER, YUKON 15 mi
01 SEPTEMBER 1984

REPORT NUMBER: 84-W40065 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1425 PDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport Rotorcraft Endorsement

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,000	2,500
LAST 90 DAYS	275	275

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The helicopter, which was on a ferry flight, was at an altitude of 1,500 feet above ground level, when the engine lost power. As the terrain in the area was tree covered, the pilot decided to carry out a forced landing on a small island in a river that was flowing parallel to the aircraft's track. During the autorotation, it became apparent that the aircraft would undershoot the island so the pilot attempted to extend the glide by the use of collective. He succeeded in reaching the island; however, the increase in collective pitch caused a loss of main rotor rpm. The helicopter landed heavily and the main rotor blades flexed downward and severed the tail boom.

Following the accident, the pilot drained an undetermined amount of fuel onto the ground. The pilot reported that a steady stream of fuel ran out of the drain for 8 to 10 minutes, thus discounting the possibility of fuel exhaustion as the cause of the loss of power. In addition, the low fuel quantity warning light had not illuminated prior to the engine power loss.

An investigation of the fuel system revealed that the main fuel tank had partially collapsed, the right side vent line to the main fuel tank was kinked and was approximately 90 per cent closed, and that the fairing for the side vent opening was missing. It could not be determined how the vent line became obstructed or for how long it had been in this condition. The engine failure may have been caused by fuel starvation due to a blocked vent line which, in turn, resulted in the partial collapse of the fuel tank; however, this could not be established with certainty.

During an external examination of the engine, no discrepancies were discovered, but the engine could not be

test run due to foreign object damage to the compressor. All components were removed from the engine, test run, and found to be serviceable. The source of the foreign object damage could not be determined, but there was no indication that foreign object damage was the cause of the flame-out.

FINDINGS:

Cause Related:

1. The engine experienced a loss of power for undetermined reasons.
2. No suitable landing site was available within a safe autorotational distance.
3. The aircraft landed heavily when main rotor rpm was lost during an attempt to stretch the glide to the only suitable landing area.

Other:

1. The right side vent line of the main fuel tank was kinked and approximately 90 per cent closed.

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QUASAR HELICOPTER LTD.
BELL 206B (Helicopter) C-GSMQ
BAILLIE ISLAND, NORTHWEST TERRITORIES
12 SEPTEMBER 1984

REPORT NUMBER: 84-W40066 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1620 MDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,400	1,200
LAST 90 DAYS	350	350

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The float-equipped helicopter was in level flight at 3,500 feet above sea level, when the pilot smelled electrical smoke. He began to turn off the electrical equipment, but the cockpit filled with dense smoke, and the pilot landed the helicopter on water. The pilot shut the engine down and stepped out on the float, at which time he noticed flames coming from the engine compart-

ment. After a few moments, they subsided, and the pilot re-entered the helicopter to retrieve the emergency supplies and the life-raft. As the pilot was trying to inflate the life-raft, he again noticed flames in the engine compartment. Unable to inflate the life-raft, the pilot made his way to shore. The helicopter burned and sank.

When the pilot smelled smoke, he noticed that his electrical load meter was reading .3 rather than the normal reading of .1. This reading would indicate that an electrical component was drawing more current than it normally would; this may have been a result of a system or component malfunction. The dense smoke was coming from the rear cabin area of the helicopter adjacent to the electrical compartment area. As there was no significant wreckage available for examination, the investigation was unable to determine the origin of the fire.

The pilot attempted to inflate his life-raft twice by holding the operating cord and throwing the raft into the water. Only six inches of the cord came out of the valise, which was not a sufficient amount to inflate the raft. By this time, the pilot had fallen into the water, and he made his way to shore. When the valise floated ashore, the pilot cut the lacing on the valise and noted that the operating end was tangled inside the case. The life-raft valise was designed for a left-hand activation. However, to meet the requirements set-out in Air Navigation Order Series II, Number 8, the valise had been modified to allow for an outlet on the right-hand side. The modification may have prevented inflation of the raft. The operating cord on this particular type of life-raft has been known to jam.

The following laboratory report was completed: LP 394/84 - Aircraft Life-Raft Container.

FINDINGS:

Cause Related:

1. The cause of the fire could not be determined because there was no significant wreckage available for examination.

Other:

1. The life-raft failed to inflate because the operating cord was jammed inside the valise.
2. The valise which was designed for a left-hand activation had been modified to allow for an outlet on the right-hand side.

SAFETY ACTION:

Action Taken:

As a result of the identified design deficiency of the life-raft valise, the Canadian Aviation Safety Board (CASB) forwarded an Aviation Safety Advisory to the Department of Transport in April 1985. In addition, the CASB issued four related Recommendations (85-17 to 85-20) on life-raft standards in November 1985. Recommendation 85-19 is applicable to this occurrence and states that:

The Department of Transport should define minimum standards for the certification and inspection of life-raft storage cases, comparable to those minimum standards applying to the life-rafts; such standards must make provision for the effective deployment of the raft under emergency conditions.

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OKANAGAN HELICOPTERS LTD.
SIKORSKY S61 (Helicopter) C-GOKZ
HALIFAX INT'L AIRPORT 40 mi S
20 MARCH 1985

REPORT NUMBER 85-H54001

PILOT HOURS:	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	6,800	1,400	14,100	5,100
LAST 90 DAYS	70	70	52	52
INJURIES:	FATAL	SERIOUS	MINOR/NONE	
CREW	-	-	2	
PASSENGERS	-	-	15	

SYNOPSIS

While en route from the offshore oil rig SEDCO 709 to Halifax Airport, the crew of the S61 helicopter noted that the main transmission oil pressure was decreasing and that the torque indication had dropped to zero. As the oil pressure continued to decrease, the pilot decided to carry out a controlled ditching in the Atlantic Ocean about six miles from land. After the helicopter was ditched, all 17 occupants boarded two life-rafts and were rescued by Canadian Forces helicopters about one hour later. Some of the passengers suffered from exposure.

The Canadian Aviation Safety Board (CASB) determined that a tee fitting in the emergency lubrication system failed, thus allowing all the main transmission

gearbox oil to be pumped overboard. The exposure suffered by some of the occupants was due to deficiencies in the immersion suits and the inadequate thermal protection of their undergarments.

CONCLUSIONS

Cause-Related Findings

1. The tee fitting in the emergency lubrication system failed as a result of high-cycle fatigue and resulted in the loss of the main gearbox lubrication.
2. The lubrication system design joined the emergency and normal systems at a common tee fitting, thus allowing the oil supply to flow overboard once the tee fitting failed.
3. The high-cycle fatigue was caused by a resonant vibration in the aircraft; the cause of the vibration was not determined.
4. The aircraft was returned to service with a substitute fitting, although the cause of the two previous failures had not been determined.
5. The procedure used for boarding the life-rafts was not in accordance with the procedure taught in survival training. As a consequence, the number 1 life-raft was damaged.
6. Some of the immersion suits worn by the occupants leaked water, and, as a result, several occupants suffered from exposure.
7. The undergarments worn by most of the occupants did not provide adequate thermal protection.

Other Findings

1. The tee fitting installed in the emergency lubrication system was an aluminum fitting that did not meet the manufacturer's specifications.
2. Regulations do not require ELTs to be included as part of the life-raft equipment.
3. Both ELTs were placed in one life-raft when the helicopter was abandoned.
4. The requirements as stated in the company's Operating Certificate for the carrying and wearing of immersion suits are inadequate.
5. Performance standards for immersion suits worn by crew and passengers for offshore operations were not in place at the time of the occurrence.

6. The life-rafts carried aboard the helicopter had been maintained to an inadequate regulatory standard and were ill-equipped for a long-term survival situation.

7. The flight crew was certified and qualified for the flight in accordance with existing regulations.

8. The weight and centre of gravity were within the prescribed limits.

SAFETY ACTION

Action Taken

1. Life-Rafts

The Canadian Aviation Safety Board has investigated several occurrences in which Canadian aircraft have ditched, forcing the crew and passengers to abandon the aircraft in life-rafts. The investigations identified deficiencies regarding the life-rafts used, and on 04 December 1985, the CASB issued the following four recommendations (CASB 85-17 through 85-20):

CASB 85-17 The Department of Transport amend ANO Series II, No. 8, to clearly prescribe the technical and performance standards for the manufacture and maintenance of life-rafts in Canada. These revised standards should clearly establish the minimum standards applicable to any life-rafts subject to any "grandfather clauses" in the revised ANO, and should include the requirement to mark the dates of design-approval and manufacture on a life-raft.

CASB 85-18 The Department of Transport strengthen its certification and inspection procedures to ensure continuing compliance with the minimum technical and performance standards throughout the in-service life of a life-raft.

CASB 85-19 The Department of Transport define minimum standards for the certification and inspection of life-raft storage cases, comparable to those minimum standards applying to the life-rafts; such standards must make provision for the effective deployment of the raft under emergency conditions.

CASB 85-20 The Department of Transport specify minimum safety standards for the carriage of signalling devices on all Canadian life-rafts that will facilitate the timely location of survivors under less than optimal weather conditions.

While the Minister of Transport accepted Recommendations 85-17 and 85-20 in part, the CASB was disappointed with the departmental response to the balance. Essentially, the safety deficiencies leading to these four recommendations remain unresolved. The CASB will

continue to monitor follow-up action to these recommendations.

2. Transmission Lubrication Line Tee Fitting

On 21 June 1985, a CASB Aviation Safety Advisory, 50069, which addressed the broken tee fitting on the transmission lubrication line of the Sikorsky S61 helicopter was forwarded to Transport Canada. Subsequently, Transport Canada advised that Sikorsky was considering a design change to modify the system and that the Federal Aviation Administration (FAA) would have to approve any modification prior to retrofit. Furthermore, the manufacturer issued Alert Service Bulletin No. 61B35-57 which called for a modification of the emergency lubrication system; Transport Canada considered compliance with this bulletin to be "essential."

After reviewing the results of balance checks conducted on a number of shafts taken from the S61 during the tear-down and examination of the S61 transmission by the CASB, Transport Canada decided that it was not necessary to issue an Airworthiness Directive. Transport Canada is confident that the corrective measures taken by the manufacturer are sufficient to ensure continued airworthiness. The CASB believes that the actions taken with respect to the broken tee fitting and routing of the oil lubrication line have corrected the deficiency identified in the advisory.

Action Required

1. Helicopter Passenger Transportation Suit Systems

Presently, there are no Transport Canada approved minimum performance standards for immersion suits for crew or passengers being transported by helicopter during extensive over-water operations. The requirements as stated in the company's Operating Certificate for the carrying and wearing of immersion suits during prolonged over-water operations are considered to be inadequate.

Despite the successful rescue of all 15 passengers and 2 flight crew by Department of National Defence helicopters within one hour of ditching, three people required hospitalization for treatment of exposure (hypothermia). This exposure occurred notwithstanding the short time spent waiting for rescue.

The requirement for crew and passengers to wear immersion suits while on board helicopters flying over water has been implemented through amendments to the Operating Certificates of the two companies currently operating offshore. While this is a positive step towards ensuring that persons flying over water are protected, the CASB believes that extension of this requirement to all offshore operations and operators is necessary.

Considering the harsh environment of Canada's offshore and northern waters, the CASB is concerned about the adequacy of regulatory provisions for the carriage and wearing of life-support equipment for passengers and crew on helicopters engaged in prolonged over-water flights. Therefore, the CASB recommends that:

The Department of Transport amend Air Navigation Order Series VII, No. 6, to make provision for the wearing of immersion suits by passengers and crew on board all helicopters flying over Canada's offshore and northern waters.

CASB 86-28

The Canadian General Standards Board, funded by a number of petroleum associations and the Canada Oil and Gas Lands Administration, is completing the development of a standard for Helicopter Passenger Transportation Suit Systems (CAN2-65.17-M). The Department of Transport Airworthiness Branch has also been involved in this developmental process. This standard for immersion suit systems will require that they:

- a) reduce thermal shock upon entry into cold water;
- b) delay the onset of hypothermia during immersion in cold water;
- c) provide acceptable flotation and minimize the risk of drowning; and
- d) do not impair the wearer's ability to evacuate a ditched helicopter.

The CASB commends these efforts to establish standards for Helicopter Passenger Transportation Suit Systems. Furthermore, the Board believes that to ensure an acceptable level of protection to users, minimum standards for inspection and repair must also be established. Therefore, the CASB recommends that:

The Department of Transport ensure that all immersion suits required by Recommendation 86-28 meet minimum performance standards throughout their in-service life.

CASB 86-29

2. Life-Rafts

Although the life-rafts used in this occurrence complied with Air Navigation Order Series II, No. 8, several deficiencies were identified with respect to the Department of Transport's accreditation and supervision of repair and overhaul centres. Both life-rafts involved in this occurrence had been patched but were not marked with the date that the patch had been placed on the rafts, as specified by the ANO. Three rafts had been inspected

nine months prior to the occurrence by a repair centre approved by the Department of Transport. The CASB notes that the Coast Guard requires that representatives from Coast Guard-approved service centres attend a course by the raft manufacturer before the centres are authorized to repair life-rafts. At the same time, overhaul centres approved by the Aviation Group (of Transport Canada) apparently need only obtain the manufacturers' manuals for similar authority. CASB Recommendation 85-18 addressed in part the failure by Department of Transport-approved overhaul centres to repair life-rafts in accordance with the applicable ANOs.

The Department of Transport rejected CASB Recommendation 85-18, stating that "an aeronautical product, including its equipment, must be maintained in accordance with the manufacturer's recommendation (E&I Manual Part I, Chapter II, Section 2.12). The repair and overhaul companies are approved under the requirement of E&I Manual Part I, Chapter III, Section 3.1. Since the carriage of life-rafts was not mandatory in accordance with ANO II, No. 8, Schedule 1 on the cited operations, rafts carried on the subject aircraft were not required to comply with an aeronautical standard. Accordingly, there is no indication that present certification and inspection procedures are not satisfactory."

The Department of Transport response to CASB 85-18 did not take into consideration the requirement by the operator in this occurrence to carry such life-rafts as directed by the amendment to his Operating Certificate. Regardless of whether the incident aircraft was required to carry life-rafts, the equipment in question could have been carried on aircraft in which approved life-rafts were required. Because neither the certification nor the inspection procedures prevented the use of substandard life-saving equipment, Recommendation 85-18 was issued. The rafts in this occurrence had not been repaired in accordance with the ANO. The CASB believes that the E&I Manual does not contain adequate controls or standards for the inspection of life-rafts, and the inspection and audit procedures of the Department of Transport for approved overhaul centres are inadequate. Consequently the CASB recommends that:

The Department of Transport amend the Engineering and Inspection Manual to include more specific standards and controls for the inspection of life-rafts used on Canadian aircraft;

CASB 86-30

and

The Department of Transport strengthen the audit procedures for centres approved by the Department of Transport for the overhaul of life-rafts used on Canadian aircraft.

CASB 86-31

3. Emergency Equipment

Emergency equipment required for the life-rafts in this occurrence was either missing or of such a quality as to render it useless. ANO Series II, No. 8, Schedule II clearly lists the equipment to be carried but does not specify a minimum standard to be met with respect to that equipment. In this occurrence, inadequately packaged D cell batteries for flashlights were found corroded, without an expiry date marked on them, and two items of survival equipment had expiry dates of several months prior to the date of ditching, even though all maintenance checks were signed off as completed. Without a minimum standard for the noted emergency equipment, including inspection procedures and maintenance schedules, there is no way to ensure that the required emergency equipment will function as required in the event of a ditching or crash landing on water. Consequently, the CASB recommends that:

The Department of Transport develop a minimum standard, including inspection procedures and maintenance schedules, for the emergency equipment to be placed in or attached to life-rafts as listed in Schedule II and III of ANO series II, No. 8.

CASB 86-32

4. SAR Location of Life-Rafts

CASB Recommendation 85-20 addressed deficiencies with respect to signalling devices on board life-rafts, and methods of locating life-rafts when weather conditions are less than ideal. The Department of Transport agreed with CASB Recommendation 85-20 and noted that the requirement for additional signalling devices such as radar reflective material would be assessed.

It is evident from this occurrence that the timely location and rescue of survivors depends to a great extent on weather conditions and the availability of suitable signalling devices. Current ANOs still do not include a standard with respect to signalling devices to be carried on board Canadian life-rafts. Such a standard should take into account the often adverse weather conditions in Canadian waters, by facilitating electronic location of life-rafts and survivors. Accordingly, the CASB recommends that:

The Department of Transport increase the requirements for the carriage of signalling devices on all life-rafts carried on aircraft in order to facilitate the timely location of survivors in all weather conditions;

CASB 86-33

and

The Department of Transport prescribe adequate inspection procedures and maintenance schedules to ensure the continuing serviceability of the signalling devices required above.

CASB 86-34

5. Ditching and Survival Training

Offshore helicopter operators and users recognize the harsh conditions involved in over-water operations. If a ditching is necessary in such conditions, pre-planned emergency procedures, rehearsed by both passengers and crew, will increase their chances of survival. The CASB believes that such procedures for passengers and crew cannot be adequately covered in a pre-flight safety briefing due to their complexity. Some organizations in the industry, involved in offshore helicopter operations, already provide ditching and sea survival training; but this is not a standardized, industry-wide practice. Therefore, the CASB recommends that:

The Department of Transport prescribe standards for ditching and sea survival training for passengers and crews engaged in offshore and northern waters commercial helicopter operations;

CASB 86-35

and

The Department of Transport require that all passengers and crews of helicopters engaged in offshore and northern waters commercial helicopter operations receive ditching and sea survival training, appropriate to the operation, on a periodic basis.

CASB 86-36

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Aviation Occurrence Reports

LES HELICOPTÈRES TRANS-QUEBEC
BELL 206B (Helicopter) C-FFTM
LAC PAU, QUEBEC
15 APRIL 1985

REPORT NUMBER: 85-Q50010 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1715 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10,000	824
LAST 90 DAYS	102	102

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The helicopter had departed Lac Pau at about 1615 eastern standard time (EST). The pilot, with a single passenger on board, was to pick up two workers near the Brisay camp, about 30 minutes flying time to the south-southwest. During the return trip, as the pilot was preparing to approach the heliport, the engine suddenly lost power. The pilot carried out an autorotation, and the helicopter was substantially damaged on landing.

The weather conditions were typical of the movement of a warm front through the area; the visibility and ceiling were reduced by heavy wet snow. The temperature was steady at about zero degrees Celsius. The precipitation stopped during the return trip when the aircraft was about three miles from Lac Pau. The helicopter was equipped with baffles to prevent snow deposits around the induction system and penetration of snow into the turbine compressor.

The turbine was sent to an engine overhaul shop where it was bench-tested. The tests indicated that the engine was capable of producing all the required power indicated in the manufacturer's specifications. The laboratory analysis of the fuel and fuel filter showed that some residues were present, but the filter was not blocked, and fuel could easily pass through it. This condition could not have caused the fuel interruption.

The aircraft engine stopped for undetermined reasons.

The following laboratory report was completed: LP 101/85 - Fuel and Residue Analyses-Fuel Filter Assembly, Bell 206B, C-FFTM.

FINDINGS:

Cause Related:

1. The engine suddenly lost all power for undetermined reasons.

Other:

-Nil-

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UNIVERSAL HELICOPTERS NEWFOUNDLAND
LIMITED
AEROSPATIALE
AS 332L SUPER PUMA C-GQLS
ST. JOHN'S AIRPORT, NEWFOUNDLAND
27 APRIL 1985

REPORT NUMBER 85-A50008

	PILOT-IN-COMMAND		CO-PILOT	
PILOT HOURS:	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	9,200	850	2,100	0.3
LAST 90 DAYS	150	150	0.3	0.3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	1

SYNOPSIS

The helicopter was being used for conversion training. During take-off, with the trainee pilot at the controls, the aircraft rolled right, yawed left, and then entered a dynamic roll-over. The main rotor blades struck the ground, and the helicopter came to rest on its right side, resulting in substantial damage but no injuries.

The Board determined that control of the helicopter was lost as a result of a combination of crew actions and an unserviceable yaw force-link in the automatic flight control system (AFCS).

FINDINGS

Cause-Related Findings

1. During lift-off insufficient left lateral cyclic control input was applied, and the collective application for lift-off was delayed, both of which increased the potential for roll-over.

2. An unserviceable yaw force-link caused a left yaw automatic flight control system input at lift-off.
3. There was no inspection requirement to check the serviceability of the yaw force-link.
4. There were no published pre-take-off or flight checks available to the crew to test adequately the yaw force-link operation.
5. As neither pilot had his feet on the pedals, they were unable to override the left yaw input from the automatic flight control system in time to be effective. As a result, directional control during lift-off was not maintained. The flight manual requires that the pilot have his feet on the pedals during take-off.
6. The combination of insufficient left lateral cyclic and the left yaw induced a right roll which exceeded the critical angle and resulted in dynamic roll-over.
7. Following the training captain's landing, the autopilot was not disengaged in accordance with the procedure outlined in the flight manual.

Other Findings

1. The manufacturer's field technical representative directed the operator to defer maintenance on the yaw channel open loop mechanism without obtaining the required regulatory approval.
2. The flight crew was certified and qualified for flight in accordance with existing regulations.
3. The aircraft was certified and equipped in accordance with existing regulations and approved procedures.
4. The weight and centre of gravity were within the prescribed limits.

SAFETY ACTION

Action Taken

One of the two Canadian operators of the AS 332L Super Puma has now developed a 200-hour inspection cycle for automatic flight control system (AFCS) force-links. In addition, the operators have taken action to ensure that their crews fully understand and appreciate the importance of following procedures with respect to the engagement and disengagement of the autopilot.

Further Action Required

1. AFCS Force-Links Failures

The Board determined that control of the helicopter was lost, in part, as a result of an unserviceable yaw AFCS force-link. Although the service life of the force-links is

supposed to be "on condition", there is currently no inspection requirement for the force-links; they are only tested when installed, adjusted or suspected of failure. This is believed to be inconsistent with established practices relative to aircraft components that are "on condition."

The initiative of Canadian operators to develop a 200-hour inspection cycle for the force-links is commendable. This inspection would coincide with other scheduled maintenance, require no special tools, and costs will be negligible. Through such an inspection, operators believe they will be able to monitor the physical force required to activate the microswitches in either tension or compression. However, there is still no mandatory requirement to carry out this inspection.

Since there is no viable pre-flight check of the force-links operation for the flight crew, and since the serviceability of the force-links can be affected by contamination or corrosion, and since there is currently no mandatory requirement to inspect these "on condition" parts, the CASB therefore recommends that:

The Department of Transport establish a requirement for a schedule of mandatory inspection for AS 332L Super Puma AFCS force-links.

CASB 87-10

Other Safety Concerns

1. CVR and FDR Requirement

There is currently no requirement for helicopters operating in support of offshore activities to be equipped with either cockpit voice recorders (CVRs) or flight data recorders (FDRs). A cockpit voice recorder, although not required by regulation, had been installed in the aircraft. The recorder and recording were recovered in good condition. The recording provided an excellent record of crew activities and conversations up to the time the aircraft rolled onto its side. This record was instrumental in determining some of the cause-related findings of this accident.

The CASB is presently developing a statement of requirements regarding CVR/FDR fitment, which will include helicopters. The Board will consider safety action after the statement of requirements is developed.

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Aviation Occurrence Reports

TRANS-QUÉBEC HELICOPTERS LIMITED
BELL 206L-1 (Helicopter) C-GLMM
PARENT, QUÉBEC 10 mi S
02 May 1985

REPORT NUMBER: 85-Q50011 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1145 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,025	1,820
LAST 90 DAYS	74	69

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was making a downwind approach to land in order to pick up hydro workers at a site near a power line. The wind was from the west at 20 gusting to 30 mph. The pilot decided to discontinue the approach while on short final. At low speed, approximately 35 feet above the ground, the pilot entered a right pedal turn in order to place the aircraft into wind before commencing the climb-out. During the turn, the tail rotor struck and was damaged by a wire. The helicopter began to spin out of control until the pilot closed the throttle and autorotated to the ground. The aircraft came to rest in an upright position.

The approach was made from the west toward the power line which was orientated in a north/south direction. As the men were located on the west side of the power line and the pilot did not wish to make the approach over the wires, she chose to make a downwind landing. Due to the unfavourable wind condition, the pilot decided not to land. During the pedal turn, the pilot did not ensure adequate clearance from the wires, and, as a result, the tail rotor struck one of them. It is possible that, during the turn, the pilot did not fully appreciate that the aircraft would drift toward the wires.

FINDINGS:

Cause Related:

1. The pilot attempted a downwind landing which brought the aircraft near the power line.
2. After discontinuing the landing, the pilot did not maintain adequate clearance from the wires, and, as a result, a tail rotor strike occurred.

Other:
-Nil-

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YUKON HELICOPTERS LTD
BELL 47-G3B1 (Helicopter) C-FRLP
WINNIPEG, MANITOBA
06 MAY 1985

REPORT NUMBER: 85-C50021 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1740 CDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,800	2,500
LAST 90 DAYS	130	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The spray-equipped helicopter was being used to carry out a spraying operation for the City of Winnipeg. At the end of a swath run, the pilot conducted a low-level turn and was descending to about five feet to align himself with the next path, when he heard a loud "pop". The helicopter struck the ground, nosed down, and the tail boom tipped up into the main rotor, and was torn away.

During the process of engine teardown and repair, it was found that a journal bearing and seal had failed in the engine turbo-charger. The degree of failure noted in the engine turbo-charger would not have been sufficient to cause a dramatic engine failure or a major reduction of the power available. However, the pilot was applying power to arrest his descent when the failure took place. Because he was only about five feet from the ground, failure of the turbo-charger and the subsequent detrimental effect on engine performance produced a delaying effect in engine response at a critical point in the flight. The pilot was unable to stop the rate of descent before the aircraft struck the ground.

FINDINGS:

Cause Related:

1. The engine turbo-charger failed, causing a decrease in engine performance at a critical point of flight.

Other:
-Nil-

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OKANAGAN HELICOPTERS
HILLER UH-12ET (Helicopter) C-FOKL
PRICE CHANNEL, BRITISH COLUMBIA
30 MAY 1985

REPORT NUMBER: 85-P50015 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 PDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,800	10
LAST 90 DAYS	150	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	2	-

SUMMARY REPORT:

The pilot landed on a mountainside to place two lumber company employees near a proposed logging area. The pilot chose a site which required him to land facing a steep slope, while resting the helicopter's skids on a crossing log. The main rotor arc was about two feet from the mountainside. While the passengers were preparing to exit the aircraft, it moved forward and the main rotor struck the ground. The damaged rotor blades then struck the tail boom, and the passengers were thrown from the aircraft. The pilot jumped clear of the helicopter as it tumbled down the mountain.

The investigation determined that there were no mechanical or aircraft loading problems prior to the accident and that the wind conditions were within the helicopter's normal operating limits.

The pilot, although experienced in rotorcraft operations, had limited flying on this helicopter type. The landing site that he chose was too confined, and it did not allow him sufficient time to react when the aircraft shifted forward.

FINDINGS:

Cause Related:

1. A landing was attempted in a too confined area.

2. The rotor struck the mountainside.

3. The pilot was unfamiliar with this helicopter type.

Other:
-Nil-

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HUGHES 369D (Helicopter) C-GYXP
ST-LAZARE AIRPORT, QUÉBEC
31 MAY 1985

REPORT NUMBER: 85-Q50018 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1610 EDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,610	800
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was being given a check-ride which included several simulated engine-out autorotations. The last autorotation was commenced from an altitude of 1,000 feet above ground level (agl). During the descent, the pilot manoeuvred the helicopter so that, at 150 feet agl, it was approximately 500 feet from the selected landing area. The check-pilot followed through on the controls as the pilot flared the aircraft 15 degrees nose-up at about 90 feet above the ground. The amount of flare was decreased gradually as the airspeed was reduced. Just prior to touchdown, the collective was raised to arrest the descent, and the helicopter then touched down. At the moment of touchdown, a severe vibration was felt, and the aft portion of the tail boom was severed by the main rotor blades.

The flight controls and main rotor assembly did not reveal any pre-existing failure or malfunction. The aircraft's weight and centre of gravity were within limits. At the time of the accident, the wind was five knots and the temperature was 20 degrees Celsius.

If on touchdown the aircraft is still in a slightly flared or nose-up attitude, the heels of the skids will touch the ground first. This would cause the aircraft to pitch nose-down as the rest of the skids came into contact with the

Aviation Occurrence Reports

TRANS-QUÉBEC HELICOPTERS LIMITED
BELL 206L-1 (Helicopter) C-GLMM
PARENT, QUÉBEC 10 mi S
02 May 1985

REPORT NUMBER: 85-Q50011 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1145 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,025	1,820
LAST 90 DAYS	74	69

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was making a downwind approach to land in order to pick up hydro workers at a site near a power line. The wind was from the west at 20 gusting to 30 mph. The pilot decided to discontinue the approach while on short final. At low speed, approximately 35 feet above the ground, the pilot entered a right pedal turn in order to place the aircraft into wind before commencing the climb-out. During the turn, the tail rotor struck and was damaged by a wire. The helicopter began to spin out of control until the pilot closed the throttle and autorotated to the ground. The aircraft came to rest in an upright position.

The approach was made from the west toward the power line which was orientated in a north/south direction. As the men were located on the west side of the power line and the pilot did not wish to make the approach over the wires, she chose to make a downwind landing. Due to the unfavourable wind condition, the pilot decided not to land. During the pedal turn, the pilot did not ensure adequate clearance from the wires, and, as a result, the tail rotor struck one of them. It is possible that, during the turn, the pilot did not fully appreciate that the aircraft would drift toward the wires.

FINDINGS:

Cause Related:

1. The pilot attempted a downwind landing which brought the aircraft near the power line.
2. After discontinuing the landing, the pilot did not maintain adequate clearance from the wires, and, as a result, a tail rotor strike occurred.

Other:
-Nil-

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YUKON HELICOPTERS LTD
BELL 47-G3B1 (Helicopter) C-FRLP
WINNIPEG, MANITOBA
06 MAY 1985

REPORT NUMBER: 85-C50021 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1740 CDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,800	2,500
LAST 90 DAYS	130	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The spray-equipped helicopter was being used to carry out a spraying operation for the City of Winnipeg. At the end of a swath run, the pilot conducted a low-level turn and was descending to about five feet to align himself with the next path, when he heard a loud "pop". The helicopter struck the ground, nosed down, and the tail boom tipped up into the main rotor, and was torn away.

During the process of engine teardown and repair, it was found that a journal bearing and seal had failed in the engine turbo-charger. The degree of failure noted in the engine turbo-charger would not have been sufficient to cause a dramatic engine failure or a major reduction of the power available. However, the pilot was applying power to arrest his descent when the failure took place. Because he was only about five feet from the ground, failure of the turbo-charger and the subsequent detrimental effect on engine performance produced a delaying effect in engine response at a critical point in the flight. The pilot was unable to stop the rate of descent before the aircraft struck the ground.

FINDINGS:

Cause Related:

1. The engine turbo-charger failed, causing a decrease in engine performance at a critical point of flight.

Other:
-Nil-

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OKANAGAN HELICOPTERS
HILLER UH-12ET (Helicopter) C-FOKL
PRICE CHANNEL, BRITISH COLUMBIA
30 MAY 1985

REPORT NUMBER: 85-P50015 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 PDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,800	10
LAST 90 DAYS	150	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	2	-

SUMMARY REPORT:

The pilot landed on a mountainside to place two lumber company employees near a proposed logging area. The pilot chose a site which required him to land facing a steep slope, while resting the helicopter's skids on a crossing log. The main rotor arc was about two feet from the mountainside. While the passengers were preparing to exit the aircraft, it moved forward and the main rotor struck the ground. The damaged rotor blades then struck the tail boom, and the passengers were thrown from the aircraft. The pilot jumped clear of the helicopter as it tumbled down the mountain.

The investigation determined that there were no mechanical or aircraft loading problems prior to the accident and that the wind conditions were within the helicopter's normal operating limits.

The pilot, although experienced in rotorcraft operations, had limited flying on this helicopter type. The landing site that he chose was too confined, and it did not allow him sufficient time to react when the aircraft shifted forward.

FINDINGS:

Cause Related:

1. A landing was attempted in a too confined area.

2. The rotor struck the mountainside.
3. The pilot was unfamiliar with this helicopter type.

Other:
-Nil-

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HUGHES 369D (Helicopter) C-GYXP
ST-LAZARE AIRPORT, QUÉBEC
31 MAY 1985

REPORT NUMBER: 85-Q50018 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1610 EDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,610	800
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was being given a check-ride which included several simulated engine-out autorotations. The last autorotation was commenced from an altitude of 1,000 feet above ground level (agl). During the descent, the pilot manoeuvred the helicopter so that, at 150 feet agl, it was approximately 500 feet from the selected landing area. The check-pilot followed through on the controls as the pilot flared the aircraft 15 degrees nose-up at about 90 feet above the ground. The amount of flare was decreased gradually as the airspeed was reduced. Just prior to touchdown, the collective was raised to arrest the descent, and the helicopter then touched down. At the moment of touchdown, a severe vibration was felt, and the aft portion of the tail boom was severed by the main rotor blades.

The flight controls and main rotor assembly did not reveal any pre-existing failure or malfunction. The aircraft's weight and centre of gravity were within limits. At the time of the accident, the wind was five knots and the temperature was 20 degrees Celsius.

If on touchdown the aircraft is still in a slightly flared or nose-up attitude, the heels of the skids will touch the ground first. This would cause the aircraft to pitch nose-down as the rest of the skids came into contact with the

ground. This downward pitching motion will thus bring the tail of the helicopter up. With the tail inclined upward, the risk of contact between it and the downward flexing main rotor blades would be great. Also, as the aircraft pitches slightly nose-down following ground contact on the heels of the skids, the pilot may tend to input a small amount of aft cyclic. This control input would be acceptable to correct for a nose-down attitude if the aircraft was airborne. However, when on the ground, the fuselage can not respond to a control input of this kind which serves only to reduce the clearance between the tail and main rotor blades. In addition, the low inertia type main rotor blades on this aircraft will not tolerate prolonged pitch application during autorotation and will lose rpm very quickly. With the main rotor rpm in a rapidly decaying state, control inputs must be precise to ensure that the aircraft touches down in a nearly level attitude, so that the risk of main rotor/tail boom contact is minimized. The skid of the aircraft did not leave marks on the ground which could be interpreted as an indication of pre-impact or a violent impact.

At touchdown, the main rotor severed the tail boom for undetermined reasons. The heels of the skids may have touched the ground first because of a too high nose-up attitude at the time of impact.

FINDINGS:

Cause Related:

1. At touchdown, the main rotor severed the tail boom for undetermined reasons.

Other:

-Nil-

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VERNON HELICOPTERS LTD.

BELL 206-L-1 (Helicopter) C-GDBR

SHELTER BAY, BRITISH COLUMBIA 3 mi N

29 JUNE 1985

REPORT NUMBER: 85-P50019 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1700 PDT

OPERATION: Specialty Aerial Control

DAMAGE: Destroyed

PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,000	2,500
LAST 90 DAYS	89	89

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	4	-	-

HISTORY OF THE FLIGHT:

The flight departed Revelstoke, British Columbia with four fire-fighters on board en route to a fire near Beatrice Lake. Approximately 25 minutes after take-off, a Forestry Services Duty Officer received a radio transmission from the helicopter pilot indicating that an engine failure had occurred and that the helicopter was going down. A while later, a helicopter on a fire-spotting patrol located the wreckage. There were no survivors.

PERTINENT INFORMATION:

The wreckage was moved by helicopter to a nearby logging road and was then transported by truck to Vancouver for detailed examination.

The helicopter struck the ground at high speed at a flight path angle of 33 degrees, in a very steep, left-bank attitude.

The examination of the engine (Allison 250-C-28B) found that the turbine assembly gas producer outside casing was ruptured and the first stage turbine wheel was missing. The engine was shipped to the Canadian Aviation Safety Board Engineering Facility for a complete analysis. Investigators were unable to recover any part of the missing turbine wheel from the wreckage.

The field investigation revealed that the fuel control lever was in the cut-off position. This was consistent with the pilot's twist grip position of the collective lever. The lower turbine shield was penetrated by debris from the first stage turbine wheel which severed the fuel lines of the fuel pump and fuel control unit. This would have

allowed fuel to spray freely about on the engine until the pilot was able to shut off the fuel.

The first stage turbine nozzle assembly was found to have phosphorus in the form of a surface deposit diffused into the diaphragm at the air cooling hole. A pressure check of the number eight oil sump was performed during the engine teardown, and leakage was observed at the sump during the test.

Recovered fuselage components, which included the cabin doors, indicated smoke and soot residue present on the interior surfaces. The baggage compartment in which two litres of gasoline were stowed showed signs of an in-flight fire. Medical evidence indicated that smoke and fire were present in the cabin area of the helicopter, prior to the helicopter striking the ground.

The engine manufacturer has issued various reports and bulletins to operators warning them of problems associated with the number one turbine wheel and possible wheel disintegration caused by oil fires. Operators are requested to check for such things as improper installation of an O ring, improper torquing of the oil sump nut, use of wrong parts, and inadequate evacuation of the oil from around the bearing back to the sump. Operators are also asked to check for signs of high oil consumption and evidence of smoke appearing during engine shutdown. If there is an oil leak problem, and, until it can be isolated and rectified, the Allison Company has designed a containment ring to prevent pieces of a failed first stage turbine wheel from disintegrating and causing further damage and/or fire. An improved vent for the number eight lubrication sump has been designed and released. The purpose of the vent is to increase the tolerance to improper assembly and to reduce the probability of oil escaping from this sump.

ANALYSIS:

The pilot initiated an autorotation when the engine failure occurred. The engine fuel control unit was found in the cut-off position and the twist grip throttle on the collective was closed as would normally be expected following an engine failure. It could not be determined how much more of the emergency check-list had been completed beyond this action or if collective had been applied before ground contact. The engine failure was caused by the failure of the number one turbine wheel. Although the engine was extensively damaged, it was evident that the wheel had departed from the engine while the helicopter was in flight.

The phosphorus deposits are indicative of an internal oil fire. An oil fire will occur in the area of the number one turbine wheel if oil from the number eight bearing lubrication system is allowed to escape past the

labyrinth seal. Once the oil is past the seal, it contacts the hot turbine wheel, vaporizes, and flows outwards. Upon reaching the area of the first stage nozzle turbine cooling air holes, it is mixed with the air passing through the holes. Because the temperature is above the flash-point of the oil, the mixture ignites. The air passing through the air holes creates a blow-torch effect, applying flame to the rim of the wheel disc. Although the turbine wheel was not recovered, examination of engines which failed in similar circumstances revealed that fatigue cracks appeared, progressed, and produced wheel failure. The engine manufacturer ascribed this to thermal fatigue.

The manufacturer's technical data reports suggest that the source of the leak may have been as a result of improper assembly. The investigation did not reveal any evidence that would support this suggestion. This particular engine did not have high oil consumption, nor was there any evidence of smoke coming from the engine.

Once the wheel had failed and disintegrated, there was nothing to stop the pieces as they flew out through the side of the engine. The hot shrapnel introduced an ignition source for any combustible material in its path. It set fire to both the engine fuel supply system and the baggage compartment's contents.

The inside of the cabin doors were exposed to fire prior to ground impact, indicating that the in-flight fire had spread to the cabin. The pilot was unable to control the helicopter due to incapacitation from the effects of the smoke and fire in the cabin area.

The following laboratory report was completed: LP 164/85 - Engine Teardown Bell 206-L-1 C-GDBR.

FINDINGS:

Cause Related:

1. An internal engine oil leak developed resulting in an oil fire which caused the uncontained failure of the number one gas producer turbine wheel.
2. The uncontained engine failure provided an ignition source which resulted in an in-flight fire.
3. The pilot was unable to control the helicopter because he was incapacitated by smoke and/or fire.

Other:

- Nil -

SAFETY ACTION:

Action Taken:

In order to preclude the possibility of internal oil fires which could progress to an uncontained turbine failure, an Airworthiness Directive (AD) 86-13-03 was issued that required the installation of the number eight Bearing Scavenge Line Air/Oil Centrifugal Separator by 31 January 1987.

In addition, Transport Canada issued a Service Difficulty Alert (86-06) in October 1986 urging the incorporation of an energy absorbing ring in accordance with Commercial Engine Bulletin (CEB) A-72-2126. The CEB requires the installation of the ring whenever the gas producer rotor is disassembled, but not later than 30 November 1987.

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VIKING HELICOPTERS LTD.

HUGHES 369D (Helicopter) C-GRYI
WAWA, ONTARIO 35 mi NW
08 JULY 1985

REPORT NUMBER: 85-O50054 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1200 EDT
OPERATION: Specialty Aerial Construction
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,207	4,280
LAST 90 DAYS	179	179

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was returning to camp trailing an empty sling cable. The pilot, while checking the fuel quantity following illumination of the low fuel level light, allowed the airspeed to increase from 60 to 80 knots. The sling cable swung rearward and contacted the tail rotor, severing the tail rotor and gear box from the tail boom. The pilot autorotated the helicopter and landed without further damage to the aircraft.

While checking the fuel quantity, the pilot inadvertently allowed his attention to be diverted from maintaining a safe airspeed. The increase in airspeed caused the cable to swing rearward, striking the tail rotor.

FINDINGS:

Cause Related:

1. The pilot inadvertently allowed the airspeed to increase to the point where the empty sling came in contact with the tail rotor.

2. The sling cable severed the tail rotor and gear box from the tail boom.

Other:

- Nil -

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UNIVERSAL HELICOPTERS LTD.

BELL 206L (Helicopter) C-GDHV
HOPEDALE, LABRADOR
11 JULY 1985

REPORT NUMBER: 85-A50019 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1100 ADT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,633	1,736
LAST 90 DAYS	150	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

After landing and disembarking five passengers at Hopedale, Labrador, the pilot prepared to return to Goose Bay, Labrador. On take-off, the fibreglass bear paw on the right-hand skid of the helicopter slid right and snagged in the turf. As the pilot continued to apply power, the helicopter rolled, crashed in an inverted attitude, and burned.

The sloping terrain at the landing site was such that the helicopter was sitting in a nose-down attitude. The proper technique for take-off in this situation would be to apply collective slowly and input aft cyclic to level the helicopter to a stable attitude, before lifting off from the ground completely. In order to establish a stable hover, the pilot should then increase the power while ensuring that no lateral or fore and aft movement takes place.

The investigation determined that the centre of gravity (C of G) was near the aft limit. This condition, combined with the sloping terrain, would have made the take-off more difficult, as the rear of the bear paws would have remained in contact with the ground longer than normal. The pilot allowed the helicopter to move to the right before completing the lift-off. This movement allowed the skid to snag in the turf and caused the helicopter to enter dynamic roll-over, when the pilot applied power to complete the lift-off.

FINDINGS:

Cause Related:

1. On take-off, the bear paw on the right skid of the helicopter snagged in the turf.
2. Incorrect pilot take-off technique caused the bear paw to snag, resulting in dynamic roll-over.

Other:

-Nil-

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BELL 206B (Helicopter) C-FOKU
HARRISON KNOB, BRITISH COLUMBIA
17 JULY 1985

REPORT NUMBER: 85-P50028 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1700 PDT
OPERATION: Specialty Aerial Control
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,142	70
LAST 90 DAYS	57	57

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was working in support of forest fire operations and was being flown with the pilot's door removed. The helicopter was on a landing pad being unloaded, when a loss of control occurred. The helicopter slid off the pad backwards in a nose-high attitude and rolled down a steep slope. The pilot sustained minor injuries when he jumped clear of the helicopter.

The landing area was a man-made clearing on a hilltop. The trees had been cleared in a horseshoe shape, which allowed minimum rotor clearance. Logs were placed so that the rear of the skids rested on a log while the front of the skids made ground contact.

According to the pilot who was monitoring the off-loading, an engine overspeed occurred, and the helicopter pitched up, veered right, and slid off the pad backwards.

Examination of the helicopter, its engine and accessories did not reveal any evidence of failure or malfunction. The reason why the helicopter pitched up and rolled off the pad was not determined.

FINDINGS:

Cause Related:

1. The helicopter pitched up and rolled off the pad for undetermined reasons.

Other:

-Nil-

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VEGA AVIATION LTD
BELL 47G2 (Helicopter) C-FCAD
SWAN RIVER, MANITOBA
21 JULY 1985

REPORT NUMBER: 85-C50058 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1815 CDT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	9,000	2,500
LAST 90 DAYS	50	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot, on a flight from St. Andrews to The Pas, Manitoba, was approaching to land for fuel at Swan River. At an altitude of 35 to 50 feet, the helicopter yawed sharply to the left. Full right pedal effected partial recovery from the yaw, but a very high sink rate developed; the pilot lowered the collective and applied forward cyclic in an attempt to gain forward speed. The

Aviation Occurrence Reports

right float struck the ramp, and the helicopter bounced; the bubble shattered, the tail boom bent to the right, and the helicopter came to rest a few feet from the initial point of ground contact.

The wind speed had reportedly decreased rapidly as the helicopter, which was near its maximum gross weight, descended to land. Because the airspeed was low and there was no wind, it is possible that the aircraft entered a vortex-ring state. Ground contact in a nose-down attitude, while moving forward and laterally, produced sufficient forces to damage the helicopter extensively.

No pre-occurrence discrepancies were found with the helicopter. The cause of the partial loss of control during the landing was not determined.

The following laboratory report was completed: LP 54/86 - Bearing Hanger Weld.

FINDINGS:

Cause Related:

1. A partial loss of control caused the helicopter to touch down prematurely; the cause of the control loss was not determined.

Other-
-Nil-

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FRONTIER HELICOPTERS LTD.
BELL 205A (Helicopter) C-GRUW
FAIRMONT HOT SPRINGS, BRITISH COLUMBIA
23 mi ENE
29 JULY 1985

REPORT NUMBER: 85-P50037 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1135 MDT
OPERATION: Specialty Aerial Control
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,500	800
LAST 90 DAYS	350	350

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter that was fitted with a 300-gallon under-slung bucket was engaged in fire fighting duties. Prior to picking up a load of retardant, the pilot flew over to a beaver pond to see if the water was deep enough to pick up water. While flying over the beaver pond at low altitude, the pilot heard a low rotor warning horn and sensed the engine speed (Lycoming T53-13B) was increasing. The pilot attempted to make a precautionary autorotational landing in the beaver pond, and a hard landing occurred.

The Bell Model 205A-1 manual states that, if an engine overspeed occurs, the pilot should complete the Engine Fuel Control Malfunction procedure. If altitude and time do not permit completion of this procedure, an autorotation should be carried out. The beaver pond was the only clear area available to carry out an autorotational landing. In order to remain within the confines of the beaver pond, the pilot was forced to flare at about 30 feet above the ground to reduce his forward speed to zero. From this height, there was insufficient rotor speed available to cushion the landing, and a hard landing occurred.

The engine was disassembled, and it was discovered that the bevel gears driving the tachometer and governor were damaged and disengaged. This would have caused the engine to enter an overspeed condition, and the disengagement of the tachometer drive would cause the LOW RPM light to illuminate. Laboratory analysis concluded that the tachometer drive bearing sleeve bushing was not properly installed at the time of the last bushing replacement. The identity of the agency which performed the sleeve bushing replacement was not deter-

mined, as there was no record of any work having been done on this component in the available aircraft log-books.

The following laboratory report was completed:
LP 194/85 - Accessory Drive Gear Assembly, Bell 205A-1.

FINDINGS:

Cause Related:

1. The tachometer drive bearing sleeve bushing was not properly installed at the time of the last bushing replacement.
2. The bevel gears in the engine, which drive the tachometer and the governor became disengaged, causing the engine to enter an overspeed condition.
3. In accordance with recommended procedure, the pilot carried out an autorotation into the only clear area available.
4. In order to remain within the confines of the beaver pond, the pilot flared at about 30 feet to reduce his forward speed to zero.
5. A hard landing occurred as a result of insufficient rotor speed being available to cushion the landing.

Other:

1. There was no record of the bearing sleeve bushing being replaced in the engine log books.

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LAKELAND HELICOPTERS LTD
HUGHES 269C (Helicopter) C-GQME
IVUJIVIK, QUEBEC
27 AUGUST 1985

REPORT NUMBER: 85-Q50050 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1030 EDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	440	260
LAST 90 DAYS	230	230

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	1	1	-

SUMMARY REPORT:

The pilot was flying the helicopter on a southerly heading at about 400 feet above ground level and had to climb over a hill in his flight path. As he approached the hill, the aircraft started to descend. The pilot, realizing that the aircraft would not clear the hill, turned around. The helicopter continued to descend, despite pilot control inputs, and landed hard with forward speed, in a tail-low attitude. The tail boom broke off, and the helicopter nosed over and caught fire. One passenger died as a result of burns received in the fire; the pilot and the other passenger were seriously injured.

At the time of the accident, there were scattered clouds at 2,500 feet above sea level, the visibility was 15 miles, the temperature was about 10 degrees Celsius, and the wind was from the south at 35 to 40 knots. The aircraft was serviceable except that the high frequency (HF) radio was inoperative. The aircraft was near the maximum allowable weight of 2,050 pounds.

The helicopter entered an area of downdrafts, on the downwind side of the hill. The helicopter was not powerful enough to overcome the effect of the downdraft and it descended. Lift was further reduced when the pilot turned downwind, and contact with the ground was at this point unavoidable. The high gross weight of the helicopter aggravated the situation.

The helicopter lacked a serviceable HF radio, and the pilot intended to fly to a destination about 29 nautical miles from the base of operations. Air Navigation Order, Series V, No. 12 makes it mandatory that a commercial aircraft operating VFR (visual flight rules) beyond 25 nautical miles of its operating base be equipped with a serviceable radio, capable of two-way communication

Aviation Occurrence Reports

with a ground station from any point along the route during flight, while operating in sparsely settled areas.

FINDINGS:

Cause Related:

1. The pilot flew the helicopter into an area of strong winds and downdrafts and was unable to avoid a descent into terrain.
2. During the crash, the helicopter caught fire, resulting in the death of a passenger.

Other:

1. The helicopter lacked a serviceable HF radio.

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AERO ARCTIC LTD.
BELL 204B (Helicopter) C-GJME
SUNRISE TOWER, NORTHWEST TERRITORIES
08 SEPTEMBER 1985

REPORT NUMBER: 85-W50047 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1140 MDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Senior Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	19,000	200	
LAST 90 DAYS	100	30	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The helicopter had been chartered by a telecommunications company to conduct sling-load operations in support of site clean-up. The aircraft, with the pilot and an engineer on board, was hover-taxiing toward a sling load of 36 empty 45-gallon drums located opposite three sets of guy wires supporting a 190-foot microwave tower. The helicopter's main rotor blades struck the middle set of wires and crashed. The crew members escaped uninjured shortly before the helicopter caught fire.

PERTINENT INFORMATION:

The day before, the helicopter crew cleaned up the site in preparation for sling loading. This clean-up involved

considerable manual labour. While en route to the job site, the owner/pilot was advised by radio-phone that his company had just lost a contract because he had not returned home yet. The pilot had had four and one-half hours sleep the previous night and had had four days off during the previous four and one-half months, none of which were entirely away from the business atmosphere.

After landing at the tower site, the helicopter was immediately refuelled, and the pilot provided the groundman with a portable radio for communication during the exercise. The crew members were wearing their shoulder restraint harnesses and protective head gear.

Previous flights were flown around the third outermost set of guy wires; however, on this occasion, the pilot lifted off, hesitated a moment, then flew directly toward the groundman while focusing on a wind indicator attached to the first innermost set of guy wires. He forgot about the middle set of guy wires which the main rotor blades hit. The engineer shouted to the pilot to watch the wires, but the pilot did not respond. The pilot could not recall what had caused the accident.

ANALYSIS:

The pilot was preoccupied with business concerns and displayed signs of fatigue due to the previous day's heavy work and lack of sound sleep. His fatigue is also evidenced by his inability to respond to the engineer's warning about the middle guy wire. The fact that he changed the flight path to straight ahead and was focusing on the wind indicator rather than scanning for obstructions also indicates that the pilot was fatigued.

Injuries to the aircrew were minor because protective head gear and shoulder harnesses were worn at the time of the accident.

FINDINGS:

Cause Related:

1. The pilot, who was suffering from fatigue and was preoccupied with business concerns, forgot about the location of the middle set of guy wires.

Other:

1. The flight crew escaped without serious injury because the shoulder harness system and safety helmets were used correctly.

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LES HELICOPTERES SHERBROOKE INC.
HUGHES 269A (Helicopter) C-GAPN
ISLAND BROOKE, QUEBEC
16 SEPTEMBER 1985

REPORT NUMBER: 85-Q50056 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1530 EDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	2,815	6	
LAST 90 DAYS	10	6	

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The pilot had been spraying in the area during the day, and the helicopter was prepared for a fourth spray swath. After take-off from a small road, the pilot moved left and parallel to it. Before translational lift could be achieved, the engine rpm was allowed to go below the minimum of 2700, which brought the main rotor rpm below the minimum limit. The helicopter struck a small earth mound 825 feet from its departure point, crashed, and came to rest on its left side.

PERTINENT INFORMATION:

There was no evidence of pre-impact airframe failure. The damage to the main rotor and to the drive train components was consistent with high power being developed at impact. The pilot took off using maximum power and felt that the aircraft performance met the standard for the type. The manifold pressure available was normal.

The aircraft load at the time of impact could not be determined since the chemical and the fuel had spilled after the occurrence. The surface wind was calm. The terrain in the take-off path and crash area was rough and covered with long grass and scrub. This type of surface decreases the ground effect to the point that up to three more inches of manifold pressure is necessary to maintain the same flight attitude as on clear even ground; one inch of manifold pressure is equivalent to approximately six horsepower.

The pilot had flown a piston engine Bell 47 helicopter for a total of 36 hours as pilot-in-command during his initial training in early 1979. He did not fly piston engine

helicopters again until 25 July 1985, when he received a licence endorsement for the Hughes, Model 269; he had logged a total of six hours on this type prior to the accident, which would have included 3.6 hours of actual spraying. The pilot had not had any training for this type of specialty flying.

The aircraft was equipped with an emergency chemical dump switch, located on the pilot cyclic stick, which would have allowed him to empty the full 60-gallon hoppers in five seconds. The only way to restore main rotor rpm, when operating at maximum power, is to immediately lower the collective pitch. This action decreases the angle of attack of the main rotor blades, which, because of the reduced rotor drag, allows rotor rpm to recover. Dumping the load of chemical would allow the pilot to decrease the collective pitch in order to maintain the required flight rpm. The pilot did not actuate the dump switch.

ANALYSIS:

The take-off was initiated at maximum power from a small road which would have offered good ground effect. Turning to the left to take off parallel to the road required more power because of the decreased ground effect over the uneven ground. The main rotor rpm was lost by using too much collective pitch when the helicopter was still very close to the ground, at low airspeed and operating at maximum power. Because the pilot did not use the emergency recovery technique and did not dump the load, climbing performance could not be obtained, and the aircraft struck the ground.

FINDINGS:

Cause Related:

1. The flight path used for the take-off run did not take advantage of ground effect, and, therefore, more power was required for take-off.
2. The engine rpm was allowed to go below the minimum of 2700, bringing the main rotor rpm below its minimum limit.
3. The emergency chemical dump switch was not actuated to permit main rotor rpm recovery.

Other:

1. The pilot had little recent experience on piston engine helicopters.
2. The pilot was not trained for this type of specialty flying.

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Aviation Occurrence Reports

VIKING HELICOPTERS LTD.
HUGHES 369D (Helicopter) C-GUVR
HEARST, ONTARIO 25 mi NE
16 OCTOBER 1985

REPORT NUMBER: 85-O50081 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0936 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,180	1,077
LAST 90 DAYS	-	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was being used by a mining company to operate out of the remote camps near Hearst, Ontario. The pilot had completed one flight to various drill sites and was completing his second run by slinging an 800-pound load of drill rods back to the main camp, 16 miles south. After approximately three miles into the flight, the load began to sway under the helicopter. The pilot decreased the airspeed from 45 mph to between 25 and 30 mph. When the load began to stabilize again, he increased the airspeed slowly. The pilot stated that the aircraft felt like it had suddenly hit an "air pocket". As the pilot looked into his sling mirror, there was a loss of directional control. The sling and load were not in sight. The helicopter began to spin, and the pilot ejected the sling load by the mechanical disconnect in the cockpit. The helicopter spun twice, at which time, the pilot slowed the forward speed and settled the helicopter into trees.

The sling was rigged to the helicopter according to company standards. The lanyard was connected to the helicopter hook-up by a metal pear-shaped link, and the two nylon straps that held the load were hooked onto the swivel at the end of the lanyard. The nylon straps were secured around the drill rods with double choker hitches.

A geologist working out of the camp hooked up the load to the helicopter. He had been briefed on how to secure the drill rods to complete the hook-up.

The drill rod casings were smeared with oil and dirt, making them slippery. When the straps were recovered and measured, they equalled the distance measured from the connecting hook below the cockpit to the tail rotor area (approximately 12 feet), indicating that the straps

were long enough to reach the tail rotor. The tail rotor gear box was found several hundred yards from the aircraft. The nylon straps were entwined around it.

While the load was attached and being moved in accordance with accepted standards and practices, it became unstable for undetermined reasons. The drill rods then slipped out of the sling. The empty straps had flown up and back, wrapping themselves around the tail rotor gear box and ripping the tail rotor and gear box from its casing. The pilot lost directional control because the helicopter had lost its tail rotor.

FINDINGS:

Cause Related:

1. The load became unstable for undetermined reasons.
2. When the drill rods slipped out of the restraining straps, the straps wound around the tail rotor gear box and tore it from its casing.
3. Loss of the tail rotor forced the pilot to autorotate into dense bush.

Other:

-Nil-

→ → → → →

ABITIBI HELICOPTERS LTD
BELL 206B (Helicopter) C-GAPH
LAKE BLONDEL, QUEBEC
21 NOVEMBER 1985

REPORT NUMBER: 85-Q50067 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1015 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,100	1,200
LAST 90 DAYS	198	198

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The helicopter was taking off from a makeshift pad at a drilling camp. On lift-off, the helicopter tilted sharply to the left, and the main rotor struck the ground on the left

side of the pad. As the transmission separated from its mounts, the main rotor struck the right side of the fuselage. The helicopter spun through 120 degrees and came to rest in an upright position. The pilot was seriously injured.

PERTINENT INFORMATION:

The helicopter was equipped with fiberglass bear paws which run the length of the skids. The aircraft was carrying 225 pounds of ore samples and one passenger seated in the left front seat, weighing approximately 210 pounds. The load was properly distributed, and the aircraft weight and centre of gravity were within prescribed limits.

The landing pad was located in a clearing cluttered by obstructions which included tree stumps and equipment. The pad was constructed of about a dozen logs of various lengths and sizes laid loosely on the ground. On the left side of the pad, the root of a stump extended about two inches toward the centre of the pad.

An examination of the landing gear revealed that the left fiber-glass skid had been damaged just ahead of the forward cross tube. The damage consisted of an indentation into which wood debris had become embedded. Witnesses reported that, during the attempted lift-off, the right skid rose as the aircraft pitched forward.

ANALYSIS:

As the pilot was lifting off, the left skid caught on the root on the edge of the pad, causing the aircraft to roll and pitch forward. The pilot lowered the collective in order to place the aircraft back on the pad, however, not in time to arrest the abrupt change in attitude. As a result, the aircraft pitched nose down and rolled left to the point that the main rotor struck the ground. The pilot explained that, as he began to increase the collective for lift-off, he became aware of the aircraft's attitudinal change but thought that it was attributable to the relatively heavy weight of his passenger occupying the left forward seat. He did not make the appropriate cyclic or collective control inputs in time to stabilize the aircraft's attitude and prevent the main rotor strike.

FINDINGS:

Cause Related:

1. The landing pad had not been properly prepared for helicopter operations, and, as a result, the left bear paw became snagged during lift-off.

2. As the pilot did not make timely cyclic and collective control inputs to ensure a stable attitude during lift-off, he was unable to arrest the abrupt attitudinal change, which resulted in the main rotor striking the ground.

Other:

-Nil-

→ → → → →

QUASAR HELICOPTERS LTD.
BELL 206B (Helicopter) C-GTVA
FAY GLACIER, BRITISH COLUMBIA
07 DECEMBER 1985

REPORT NUMBER: 85-W50068 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1230 MST
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	9,700	6,500
LAST 90 DAYS	100	100

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The helicopter pilot, under the supervision of a company pilot, was carrying out mountain training landing exercises on a glacier at an elevation of 9,500 feet above sea level (asl). After several successful hover landings had been completed, the supervisory pilot took control to demonstrate a run-on landing. During the landing run, the right skid broke through the crusted snow, and the helicopter rolled onto its right side.

PERTINENT INFORMATION:

The purpose of the flight was to allow the pilot, under supervision, to experience all-up weight operations at high elevations. The helicopter was being flown close to the all-up weight of 3,200 pounds; this was achieved by carrying a passenger. The helicopter was on conventional skid gear equipped with bear paws which permit safer operations on snow or other soft surfaces.

The mountain winds had drifted and packed the snow on the glacier, forming a hard crust. However, this action was not uniform, and the crust, which was thick and firm in some areas, was thin and weak in other areas.

Aviation Occurrence Reports

The crew had been training in the area for a week and was aware of the general surface conditions. The supervisory pilot carried out an aerial reconnaissance of the area before demonstrating the landing. However, it was difficult to tell just how heavily crusted or firm the surface actually was; this was the first time a run-on type landing had been attempted in the area. During other type landings, a pilot is able to check the touchdown area as he reduces power, thus ensuring that the area will support the weight of the helicopter; however, this is not possible during a run-on landing.

ANALYSIS:

The supervisory pilot believed that the selected area was suitable for a run-on landing; however, the soft, weaker, snow-crusted areas could not be detected during the reconnaissance. Under the circumstances, the use of the run-on technique deprived the pilot of an opportunity to test the weight-bearing capability of the snow surface. When the right skid ran onto the weaker surface, it broke through abruptly, and the helicopter rolled onto its side before the pilot could react.

FINDINGS:

Cause Related:

1. The use of the run-on landing technique was inappropriate for the variable weight-bearing capability of the snow surface.

Other:

- Nil -

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HUGHES 369-HS C-GHGS
VANDERHOOF AIRPORT, BRITISH COLUMBIA
27 JULY 1985

REPORT NUMBER: 85-P50035 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1320 PDT
OPERATION: Private other
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	750
LAST 90 DAYS	60	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the helicopter was performing a demonstration flight at the Vanderhoof Airshow. After completing one steep pedal turn, he accelerated in forward flight and zoomed up to an angle of approximately 45 degrees. The helicopter stopped and then started rearward flight in a steep, tail-down attitude. As the speed increased to an estimated 30 knots, the nose started to turn to the left, and, at this time, the tail rotor fell off. The aft tail boom then separated from the fuselage, and the pilot lost control of the helicopter which fell to the ground. The pilot was able to lessen the impact to some extent by raising the collective control; however, he was seriously injured on impact.

A maximum rearward speed limit is not specified in the performance data section of the owner's manual for the helicopter. However, it does state that "controllability during downwind hovering, sideward and rearward flight has been demonstrated to be adequate in winds up to 20 knots." At the time of the accident, the weather was clear, and the wind was light at five knots.

Study of the wreckage and video film of the flight taken by a spectator indicate that, during the descent, the tail rotor blades struck the left side of the tail boom, causing the tail rotor gearbox to fracture. The tail rotor assembly fell free after the pitch change shaft broke. Because of air loads on the vertical and angled fins, the weakened tail boom then folded up into the main rotor disc and was severed by the main rotor blades.

Examination of the aircraft did not reveal any pre-existing condition which would have contributed to the accident.

The reason for the tail rotor failure could not be determined; however, the helicopter was being operated beyond the demonstrated controllability limits.

FINDINGS:

Cause Related:

1. The pilot operated the helicopter in rearward flight beyond the demonstrated controllability limits.
2. The tail rotor blades struck and weakened the tail boom, which then led to the breakup of the tail rotor gearbox and tail boom.

Other:

-Nil-

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ENSTROM F-28A (Helicopter) C-GHJZ
MELI LA DOU LAKE, QUÉBEC
27 OCTOBER 1985

REPORT NUMBER: 85-Q50063 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 0900 EDT

OPERATION: Private Recreational

DAMAGE: Substantial

PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,800	1,500
LAST 90 DAYS	30	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot was taking off vertically from a small clearing. At a height of approximately 75 feet above ground level (agl), the main rotor rpm started to decrease. The pilot made a 270-degree left pedal turn to align the aircraft with the full length of the clearing. During the turn, the rotor rpm decayed further, and the helicopter began to descend. The pilot landed the helicopter straight ahead on a narrow trail bordered by trees and other obstacles. During the approach and landing, the main rotor struck some trees, and the helicopter settled to the ground in an upright position.

The clearing was approximately 100 feet square and was bordered by 15-to-50-foot high trees. The density altitude was about 500 feet above sea level.

The investigation revealed that there were no mechanical deficiencies prior to impact. The helicopter's centre of gravity was within limits; however, the gross weight exceeded the maximum take-off weight of 2,150 pounds by approximately 80 pounds.

While in ground effect, the lift generated by the main rotor was sufficient to support the overloaded aircraft. Once out of ground effect, the pilot would have had to have applied additional power and main rotor pitch in order to prevent the aircraft from settling back to the ground. However, the engine power available was insufficient to maintain the main rotor rpm (Nr), and, as a result, the Nr decreased. Any decrease in the Nr would have reduced the total lift developed by the main rotor, and the aircraft would have started to settle, and, in addition, a further drop in Nr would have been experienced. In this aircraft, a hovering left turn is achieved by a pedal input which increases the pitch angle of the tail rotor blades. This action makes a demand for engine power. However, as no additional power was available, and as the tail and main rotor drives are interrelated, such an input will result in a further decrease in Nr. The cumulative loss in Nr reduced the lift generated by the main rotor, and, as a result, the aircraft descended into the trees.

FINDINGS:

Cause Related:

1. In an attempt to take off in an overloaded aircraft, the pilot experienced a loss of main rotor rpm and lift, and, as a result, the aircraft descended into trees.
2. The left turn initiated by the pilot further reduced main rotor rpm and its ability to generate lift.

Other:

-Nil-

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Aviation Occurrence Reports

DEPARTMENT OF TRANSPORT
BELL 206D (Helicopter) C-FCGL
WINNIPEGOSIS, MANITOBA 6 mi E
30 NOVEMBER 1984

REPORT NUMBER: 84-C40091 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1130 CST
OPERATION: State
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE	
TOTAL	10,000	3,150	
LAST 90 DAYS	90	90	
INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The helicopter was on a visual flight rules (VFR) flight from Grand Rapids, Manitoba to Selkirk, Manitoba, with several en route stops to service marine navigation aids on Lake Winnipegosis. After the last stop, the pilot set the heading for Selkirk, and the flight continued at low level and over an expanse of a snow-covered lake. While over the lake, the visibility diminished in ice fog; however, the pilot continued on his course as he could still see a point of land ahead. The visibility soon reduced rapidly in the ice fog, and the pilot lost all visual reference with the lake's surface and the distant shoreline. He attempted to turn back using his instruments, but, during the turn, the helicopter struck the surface of the lake and broke up. The pilot and his passenger were rescued about one and one-half hours later.

Visual meteorological conditions prevailed throughout the area with greatly reduced visibility in isolated patches of ice fog. The prevailing conditions were essentially as had been forecast. Earlier in the flight, the pilot had been forced to land due to conditions of reduced visibility, and he had to wait until the conditions improved a short while later. The aircraft was not equipped for instrument flight; only very basic instrumentation had been installed. The pilot was not instrument rated; he had only five hours of simulated instrument time, none of which was in the past 90 days.

The patches of ice fog were isolated and, therefore, could probably have been avoided; however, the pilot elected to continue the flight into conditions of reduced visibility in one of these fog patches. After entering these conditions, the visibility reduced further, and the pilot decided to turn back at low altitude rather than in-

itiate a climb. During the turn, the aircraft descended and struck the surface of the lake.

FINDINGS:

Cause Related:

1. The pilot elected to continue in VFR flight into an area of reduced visibility in an isolated fog bank.
2. The aircraft was not equipped for instrument flight, nor was the pilot instrument rated.
3. While the aircraft was in the fog bank, the visibility reduced further, and the pilot lost all visual reference with the surface.
4. When the pilot attempted to turn back, altitude was lost, and the aircraft struck the surface.

Other:

- Nil -

SAFETY ACTION:

Action Taken:

Transport Canada has implemented a comprehensive pilot awareness program which emphasizes the importance of non-instrument-rated helicopter pilots avoiding IFR conditions.

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SKYSEEKER MK III (Ultralight) C-IAQC
BOW ISLAND, ALBERTA 10 mi SW
17 APRIL 1983

REPORT NUMBER: 83-W35003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0945 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	250	4
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

While in cruise flight, the pilot eased back on the control column to initiate a climb. He felt none of the normal control pressures in the column, and the aircraft began to descend. The pilot was unable to control the rate of descent; however, rudder and aileron control were still available. The pilot chose to land close to the shoreline of a lake, and, on touchdown, the aircraft nosed over and sank in shallow water. The pilot released his seat-belt and waded ashore.

The investigation determined that the bolt at the base of the control column had broken during flight. This bolt normally acts as a pivot point to enable the pilot to make elevator and aileron control inputs. Although aileron control remained, the bolt failure eliminated elevator control, and thus the pilot's ability to control the descent rate. This ultralight is not equipped with a pitch trim device, and, because of the pilot's weight (236 pounds), the aircraft had a forward centre of gravity. Therefore, when the bolt broke, the forward centre of gravity caused the aircraft to descend. The bolt failed in fatigue in the bending mode. This failure was due to the inadequate design of the control column attachment to the elevator torque tube which supplies pitch control.

The pilot was unaware that the design of the elevator torque tube allowed full-pitch control in the event of a failure of the pivot tube. This feature had not been highlighted by the manufacturer.

FINDINGS:

Cause Related:

1. The design of the control column with respect to pitch control was inadequate.

2. The pivot bolt failed in fatigue in the bending mode, thus depriving the pilot of normal pitch control.

3. The pilot was unaware that the design of the elevator torque tube allowed full-pitch control, since this feature had not been highlighted by the manufacturer.

4. The forward centre of gravity and the lack of a trim mechanism caused the aircraft to pitch down.

Other:

- Nil -

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LAZAIR (Ultralight) C-IANX
AMOS AIRPORT, QUEBEC 1/2 mi E
10 JULY 1983

REPORT NUMBER: 83-Q35009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: None

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	90	80
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight took off, and, at about 1,000 feet above the ground, the right engine (Rotax 9.5 HP) started to vibrate violently. The pilot's attempts to throttle back as well as to cut off the magneto were unsuccessful. An emergency landing was attempted while the whole aircraft was vibrating. The right wing hit a tree, and the aircraft struck the ground at low speed. The pilot was seriously injured.

The investigation revealed that three of the six right engine mounts failed in flight. The failure of each engine mount was initiated by the separation of the centre pin from its surrounding rubber. However, it could not be determined what caused these two components to separate.

The failure of the engine mounts caused severe vibrations which, in turn, resulted in the throttle linkage and magneto wire becoming disconnected. As a result, it was impossible to throttle back or shut down the engine.

Aviation Occurrence Reports

The pilot had to land on unsuitable terrain, and the aircraft struck a tree during the approach.

The pilot did not have a licence, nor was he required to by regulation.

FINDINGS:

Cause Related:

1. The right engine mount's centre pins separated from their surrounding rubber for undetermined reasons.
2. The separation of the pins from the rubber caused the mounts to fail, resulting in severe engine vibrations which made the aircraft difficult to control.
3. The engine could not be shut down as the throttle linkage and the magneto wire had become disconnected.
4. The right wing struck a tree while the aircraft was on approach to an emergency landing.

Other:

- Nil -

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LAZAIR (Ultralight) C-IAUH
MARIEVILLE, QUÉBEC
22 OCTOBER 1983

REPORT NUMBER: 83-Q35011 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0815 EDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3	3
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

Following a test run on the runway to feel the response of the controls, the student pilot took off; immediately after take-off, the aircraft made a shallow bank to the right toward a power line running parallel to the runway. The pilot was unable to straighten the aircraft, and in an attempt to avoid the power line, he applied full right aileron. The aircraft lost altitude and side-slipped to the

right; the right wing tip hit the ground and the aircraft immediately cartwheeled to the right.

There was no evidence of any mechanical failure. The low time pilot was not familiar with the separated ailerons and rudder control of this particular aircraft; all his previous flights, one month earlier, were on an aircraft of the same type, but one which was equipped with a control mixer. The control mixer is a system by which ailerons and rudder are controlled by a single action on the control stick. This aircraft was also equipped with an overhead stick. Some student pilots are confused by this unusual stick configuration and apply bank corrections the wrong way.

FINDINGS:

Cause Related:

1. The pilot had very limited training and experience and was not familiar with the control system of the aircraft.
2. The pilot was unable to maintain directional control of the aircraft.

Other:

-Nil-

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STRIPLIN SKY RANGER (Ultralight) C-IBXV
LETHBRIDGE, ALBERTA
22 NOVEMBER 1983

REPORT NUMBER: 83-W35017 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1655 MDT
OPERATION: Private Testing
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,372	72
LAST 90 DAYS	20	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The builder and the pilot of the ultralight airplane had been dissatisfied with its performance since building it from a kit. To obtain more power, a larger engine was in-

stalled and some time later the centrifugal clutch at the propeller drive-pulley was modified. The pilot took off to conduct a test flight following the modification, but, after take-off, the engine surged and the pilot thought the problem was carburettor icing. He initiated a forced landing on the departure runway. Engine RPM could not be controlled, so the engine was shut down until on final approach, then restarted for the landing. At about 15 feet above the runway, the engine RPM suddenly increased and, simultaneously, the thrust decreased. The pilot was unable to flare the aircraft prior to impacting. The nose wheel strut failed and the ultralight slowly over-turned, coming to rest in an inverted position.

When the centrifugal clutch was dismantled, the clutch shoes were found to be incorrectly installed for the direction of rotation. Instead of being in the compression or "Push Mode", they were in the tension or "Drag Mode". As installed, the clutch could slip when under high torque. Metal deposits were found that confirmed clutch slipping. Plate washers had been attached to the shoes to increase mass and counteract the slipping.

Because the pilot mistook the engine surge due to clutch slippage for an indication of carburettor icing, he restarted the engine on final for a forced landing thinking that power would be available. When the clutch slipped after the restart because of the engine load, the power to the propeller suddenly decreased. As a result, the speed decayed rapidly and became insufficient for a flare prior to touchdown.

FINDINGS:

Cause Related:

1. The centrifugal clutch shoes were installed incorrectly for the direction of rotation resulting in the clutch slipping under high torque and related engine surging.
2. The pilot turned the engine off soon after take-off and initiated a forced landing because the engine was surging.
3. Because the pilot mistook the engine surge due to clutch slipping for an indication of carburettor icing, he restarted the engine on final, thinking that power would be available.
4. When the clutch slipped after the restart, the power to the propeller suddenly decreased, the speed decayed rapidly and became insufficient for a flare prior to touchdown.

Other:
-Nil-

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BIRDMAN ENTERPRISES CHINOOK WT II
(ULTRALIGHT) C-IBOV
FORT SASKATCHEWAN, ALBERTA 5 mi S
19 FEBRUARY 1984

REPORT NUMBER: 84-W45003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	90	10
LAST 90 DAYS	8	8

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

During a touch-and-go landing in his ski-equipped ultralight, the pilot attempted to apply full throttle for take-off. Initially, only partial power was available, as the throttle would not move to the full-open position. The pilot had previously experienced this problem and by jiggling the throttle lever, he was able to achieve full throttle and continue the take-off roll. Just before the aircraft lifted off, the left ski hit deep snow. The ultralight slowed down and veered to the left toward trees bordering the take-off area. During the climb-out, as the aircraft flew over the trees, the left horizontal stabilizer caught the top of a dead tree. The aircraft came to rest in the trees, 20 feet above the ground.

The investigation determined that vibration had loosened the throttle cable clamping nut. As a result, the cable buckled and full movement of the throttle arm at the carburettor was initially prevented. As the pilot was unable to achieve full throttle during the initial phase of the take-off sequence, the take-off run was extended into deep snow. The deep snow further slowed the aircraft and caused it to swing toward the trees on take-off. The evidence suggests that had the pilot seen the dead tree, he would have been able to manoeuvre around it; however, the tree was difficult to detect at the low altitude.

FINDINGS:

Cause related:

1. Due to a known mechanical deficiency in the throttle cable control, the pilot was unable to achieve full power during the initial take-off, and, as a result, the take-off roll was extended.

Aviation Occurrence Reports

2. The pilot did not reject the take-off when the throttle problem became apparent.

3. The extended take-off resulted in the aircraft veering toward trees after take-off as a result of the left ski hitting deep snow.

4. The pilot did not see the obstruction.

Other:

- Nil -

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ZENAIR TRI-Z-CH300 (Amateur-built) C-FRJL
BRYSON, QUEBEC
28 APRIL 1984

REPORT NUMBER: 84-Q40019 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1115 EST
OPERATION: Private Testing
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	105	-
LAST 90 DAYS	-	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot/builder wished to test the airspeed indicator of the float-equipped aircraft to which he was putting the finishing touches. This test was to be carried out by taxiing at high speed on the water. The pilot turned the aircraft into the wind, then increased power. The aircraft climbed onto the step, then took off, climbed to about 20 feet and began a slow left turn. The pilot closed the throttle and continued the turn in order to land in the opposite direction from the take-off. During this manoeuvre, the left wing tip touched the water; the aircraft was thrown onto the float bumpers and nose, then cartwheeled before coming to rest in shallow water.

The pilot had no experience on this aircraft type and did not intend to make a flight that day. In order to test the airspeed indicator by taxiing on the water, the pilot used a power setting which was sufficient in combination with the head wind to cause the aircraft to take off. The pilot was concentrating on the airspeed indicator and was not immediately aware of the take-off. Because of the propeller torque, the aircraft began a left turn. Since

he had never handled the aircraft in flight and wished to set it down as quickly as possible, the pilot closed the throttle, continued the left turn, and attempted a downwind landing. Because the aircraft was still banking close to the surface, its left wing tip struck the water. The violent yawing movement that ensued caused the aircraft to cartwheel.

FINDINGS:

Cause Related:

1. The pilot had no experience on this type of floatplane.

2. During taxi at high speed on the water into a head wind, the aircraft inadvertently took off and began to turn to the left.

3. When the pilot became aware of the take-off, he closed the throttle and continued the turn in order to make a downwind landing; during the turn, the left wing tip struck the water and the aircraft cartwheeled.

Other:

-Nil-

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SMITH DSA-1 (Amateur-built) C-FNXQ
CASTLEGAR, BRITISH COLUMBIA 10 mi W
10 JUNE 1984

REPORT NUMBER: 84-P44007 (Incident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1730 PDT
OPERATION: Private Recreational
DAMAGE: Minor
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	550	120
LAST 90 DAYS	20	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

Shortly after the aircraft took off on a local flight, the engine (Lycoming O-235-CI) started to run rough. The pilot attempted to return to Castlegar, but the engine lost power, and a forced landing was carried out in a nearby campground, resulting in minor aircraft damage.

Prior to the flight, the pilot found water in the sediment bowl. He drained the fuel system until only fuel remained and then cleaned out the sediment bowl and reinstalled it. A run-up was carried out, and the engine performed normally.

After the forced landing, the pilot immediately checked the sediment bowl and found water and a white sludge present. A laboratory analysis of the white sludge revealed that it contained inorganic crystalline chlorides derived from unknown sources external to the fuel system.

The aircraft had been parked outside for over a week in pouring rain. Since the fuel tanks were only three-quarters full, it is possible that water seeped into the fuel tanks through either the fuel cap or the vent system. The pilot reported that in the previous three years he had never had any problems with water in the fuel system. The origin of the water and other foreign matter was not determined.

The following laboratory report was completed: LP 370/84 - Fuel Fitting Sediment.

FINDINGS:

Cause Related:

1. The aircraft engine lost power because the fuel system was contaminated with water and foreign matter of undetermined origin.

Other:

- Nil -

→ → → → →

BIRDMAN ATLAS 300 XC (Ultralight) C-IBJF
BARRHEAD, ALBERTA 5 mi W
01 JULY 1984

REPORT NUMBER: 84-W45006 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2145 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	Unknown	100
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW			
PASSENGERS			
PASSENGERS	-	1	-
OTHER	-	-	3

SUMMARY REPORT:

An unlicensed balloon pilot had conducted several static flights in a balloon tethered to the ground. When it became necessary to connect a new propane bottle, the pilot, using a quick-disconnect coupling that was not approved by the balloon manufacturer, attached the feeding line to a full propane bottle. When he opened the valve on the bottle, the quick-release system separated from the container and liquid propane spilled out. A pilot-light on the burner ignited the gas and started a fire in the balloon's basket. The pilot and his one passenger were both severely burned; the pilot jumped from the basket and the passenger was blown out by the exploding gas.

The fire burned through the mooring lines and the balloon began to rise on its own. A bystander became tangled with a rope which was attached to the balloon and was carried to a height of 10 feet before falling to the ground. As the unoccupied balloon drifted over a populated area, the basket continued to burn, releasing propane bottles which exploded and injured two other bystanders on the ground. When the fire subsided, the balloon landed.

The investigation determined that the unapproved quick-disconnect coupling on the valve of the propane bottle was not fully engaged when the pilot changed tanks. When the valve was opened, gas pressure caused the disconnect assembly to separate, thus permitting the gas to escape. The inexperienced pilot did not hold a balloon licence, nor is one required for static flights in a hot air balloon.

FINDINGS:

Cause Related:

1. The quick-disconnect installation used was not approved by the balloon manufacturer.
2. The quick-disconnect assembly was not fully engaged.
3. Gas pressure caused the quick-disconnect assembly to separate when the valve was opened.
4. A pilot-light on the gas burner ignited the escaping gas.
5. The mooring lines burned and the unoccupied balloon became airborne over a populated area.

Other:

1. No pilot licence is required for static flights in a hot air balloon.

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EIPPER QUICKSILVER MX (Ultralight) C-IBKE
MILE 51 ALASKA HIGHWAY, BRITISH COLUMBIA
02 SEPTEMBER 1984

REPORT NUMBER: 84-W45008 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1350 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	200	130
LAST 90 DAYS	-	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight aircraft had been previously damaged and was on its first flight since the pilot and his friend had repaired the wing and engine. After an unusually long take-off run, the pilot tried unsuccessfully to climb above a power line. When he realized that the aircraft would not be able to clear the line, the pilot attempted to turn left, but the right wing hit the power line. The aircraft pitched nose down and struck a paved road.

The investigation revealed that the engine had been replaced when the aircraft was repaired and that the original propeller and exhaust system were reinstalled.

These components were not compatible with the new engine, and as a result, there was a substantial decrease in engine power output. Consequently, the aircraft's take-off and climb performance were significantly degraded.

The pilot had not flown recently, and as a result, he did not recognize the reduced aircraft performance in time to take corrective action.

FINDINGS:

Cause-Related:

1. The exhaust system and propeller used were not compatible with the newly installed engine, causing a substantial decrease in engine power output.
2. The decrease in engine power degraded the aircraft's take-off and climb performance and the aircraft struck a power line in the departure path.
3. The pilot had not flown recently, and as a result, he did not recognize the reduced aircraft performance in time to take corrective action.

Other:

- Nil -

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BEDE 4 (Amateur-built) C-GEVZ
OSHAWA AIRPORT, ONTARIO
06 OCTOBER 1984

REPORT NUMBER: 84-O40071 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1616 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	135	56
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot intended to go flying in the local area. As the aircraft was taxiing on the grass taxiway, the nose gear strut failed, and the aircraft came to rest on the nose cowl.

The fractured nose gear strut and bracket were forwarded to the engineering facility for examination. It was determined that fatigue failure had occurred in the bend of the tube type strut at a buckle. A buckle creates a geometrical stress concentration which is conducive to fatigue initiation. During construction, the required bending of the nose gear strut is achieved by a heating process during which special bending techniques are used to prevent the metal from buckling. The required techniques could not have been employed in the bending of this strut. Additionally, the heat treatment of the tube wall section was inadequate and resulted in reduced mechanical properties which likely accelerated the time of failure.

The following laboratory report was completed: LP 335/84-Nose Gear Strut and Bracket.

FINDINGS:

Cause Related:

1. Incorrect bending technique induced buckling which, combined with an inadequate heat treatment, made the nose gear strut susceptible to fatigue and failure.

Other:

-Nil-

→ → → → →

ATLAS 215XC (Ultralight) C-IATF
RICH VALLEY, ALBERTA 2 mi NW
10 OCTOBER 1984

REPORT NUMBER: 84-W45011 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1750 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	65	65
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

En route home after a one-hour flight, the pilot saw his neighbours in front of their house, and he decided to stop for a visit. The pilot approached from the east, intending to make a 90-degree right turn to a landing area

just past the farm yard. Just before the turning point, the aircraft struck a power line 20 to 30 feet above ground level and crashed. The left wing and left horizontal stabilizer were damaged on ground impact.

The pilot had landed at the selected field many times but had not approached from this direction before. He also knew about the power lines associated with the farm although he forgot about the one he hit. As well, his ability to see the power line may have been adversely affected by the position of the sun and the smoked-lens goggles he was wearing.

FINDINGS:

Cause Related:

1. The pilot flew a low-level approach over an area where he knew power lines were located.
2. The aircraft struck a power line and crashed.

Other:

-- Nil --

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TIERRA II (Ultralight) C-IE00
MONT-LAURIER AIRPORT, QUÉBEC
25 NOVEMBER 1984

REPORT NUMBER: 84-Q45003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 EST
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	275	12
LAST 90 DAYS	25	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was on final approach, and, as the student adjusted the throttle, the engine (Rotax 532) stopped. The instructor took over the controls and attempted to glide to the runway but found that he was unable to reach it. To avoid colliding with the bluff on the approach end, the pilot veered sharply 90 degrees to the right, and the aircraft stalled and struck the ground in a

nose-down, right-wing-low attitude. The instructor was seriously injured.

During the investigation, the engine was run at various power settings and was found to operate satisfactorily. Fuel samples taken from the wreckage were found to conform to the aircraft manufacturer's specifications. At the time of occurrence, the temperature was one degree Celsius, the dew point was minus one degree, and there was some fog; these conditions are conducive to carburettor icing. The aircraft was not equipped with a carburettor heat system. The engine stopped because of carburettor icing and the resultant disruption of air and fuel flow.

FINDINGS:

Cause Related:

1. Although the aircraft was not equipped with a carburettor heat system, the aircraft was flown in conditions conducive to carburettor icing.
2. The engine stopped because of carburettor icing.
3. The aircraft stalled and crashed while the pilot was attempting to avoid bluff during the forced landing.

Other:

- Nil -

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TETRATORN TIERRA II (Ultralight) C-IEDS
ST. JUSTE DE BRETENIERES, QUEBEC
14 DECEMBER 1984

REPORT NUMBER: 84-Q45004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1400 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	22	22
LAST 90 DAYS	22	22

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot of the ultralight, while on a solo local flight, made an approach and landing at a 700-foot strip.

The aircraft touched down about halfway down the runway. The pilot elected to go around and applied full power. After becoming airborne, the aircraft struck a power line support. The ultralight veered sharply to the left, and the right wing struck a hydro pole. The aircraft crashed to the ground, coming to rest against a small house.

The aerodrome consisted of a 700-by-150-foot ploughed stretch of a local race track which was blocked at each end by a snow-covered pile of dirt. The south end (the landing direction) was also obstructed by a 10-foot-high wooden panel enclosure. The strip was covered with hard-packed snow. The houses were located about 275 feet beyond and to the left of the departure end. The weather was suitable for the flight, and the winds were light.

The student pilot had just completed an ultralight training program, had passed the written examination, and had been recommended for an ultralight private licence. The student had completed all his previous landings at the same 3000-foot airstrip. During the training period, the student had considerable difficulty judging heights and distances.

The student pilot, realizing that he had landed further down the runway than planned, reported that he hesitated briefly and then applied full power. The pilot elected to go around because he was uncertain of the braking effectiveness on the hard-packed snow, and he was concerned with the obstruction at the end of the strip. The pilot managed to get the aircraft airborne before the departure end but was unable to clear the power wire support.

This was the student pilot's first landing away from his training base. The strip was much shorter than the one with which he was familiar. Given his difficulty at judging heights and distances, the student attempted a landing on a strip that was too short for his experience level. After landing too far down the runway, the student did not immediately apply power for a go-around, and, as a result, the aircraft was unable to clear the obstacles beyond the end of the runway.

FINDINGS:

Cause Related:

1. The student pilot of the ultralight attempted a landing on a strip that was too short for his experience level.
2. The student did not immediately apply power after electing to go around.

Other:

- Nil -

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CANAERO TOUCAN P2 (Ultralight) C-IFSP
MARYHILL, ONTARIO 1 mi SE
23 DECEMBER 1984

REPORT NUMBER: 84-O/45026 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1100 EST
OPERATION: Private Training
DAMAGE: Destroyed
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,770	30
LAST 90 DAYS	11	11

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	2	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was reported by witnesses to be flying at a height of about 500 to 1,000 feet above ground level and was seen to be carrying out certain manoeuvres described as stall turns and wing-overs. During one of these manoeuvres, the right wing was seen to fold upwards, and the aircraft fell to the ground. Both pilots received fatal injuries.

The Toucan ultralight was the second prototype and was designed as a two-seater to be used as a recreational aircraft and a trainer. The purpose of the flight was to familiarize the other pilot with this type of aircraft.

The weather was reported to be clear, the visibility good, and the wind gusty at about 15 knots.

The investigation revealed that the right wing lift strut had failed at the lower attachment point, where there was evidence of several types of loading. A tension failure of the material between the lower bolt hole and the end of the strut most likely occurred first, since there was no elongation of the lower bolt hole itself. A forward movement of the wing and the lift strut would have caused the load for this type of failure.

The tension load put on the lift strut by the lifting forces on the wing caused the upper bolt hole to elongate and, as a result, reduced the residual strength of the material. A shear failure of the material between the two holes then occurred and resulted in ultimate failure of the lift strut attachment.

If the angle of attack of the wing was increased rapidly by a high G force, the wing would have been subjected to the types of loading that caused the lift strut to fail. The magnitude of the forces experienced by the Toucan wing could not be determined. However, the limit load based on laboratory tests and calculated load would be less than 3.8G. There are no airworthiness standards for ultralight aircraft.

As the wind was gusty, there was likely turbulence at the heights flown by the aircraft. This turbulence would have imposed a load on the aircraft. Also, the type of manoeuvres flown by the crew would have created additional loads. The load, which caused the strut to fail, greatly exceeded the capability of the material at the attachment point and was likely due to a combination of pilot-induced forces and wind-gust loading during the manoeuvres.

The following laboratory report was completed:
LP 26/85 - Ultralight Investigation.

FINDINGS:

Cause Related:

1. The aircraft fell to the ground when the right wing folded up.
2. The right wing folded up because of the failure of the wing lift strut.
3. The wing lift strut failed due to overload, as a result of high wing loading.

Other:
-Nil-

→ → → → →

Aviation Occurrence Reports

THOR 1A (Ultralight) C-IAKR
LAC BAKER, NEW BRUNSWICK
19 JANUARY 1985

REPORT NUMBER: 85-A55001 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1530 AST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	225	25
LAST 90 DAYS	-	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the ski-equipped ultralight aircraft was on a local pleasure flight, intending to land on a frozen, snow-covered lake. While on final approach, the aircraft struck unmarked power lines and landed without further incident.

The pilot reported that the sun reflecting off the snow-covered lake made the power lines difficult to see. There is no indication that a surveillance fly-pass was carried out prior to the attempted landing. There was no regulatory requirement for the power lines to be marked.

FINDINGS:

Cause Related:

1. The aircraft struck an unseen power line while on final approach to land on a snow-covered lake.

Other:

-Nil-

→ → → → →

SPECTRUM RX-550 (Ultralight) C-IFHU
PORT CARTIER, QUÉBEC
19 JANUARY 1985

REPORT NUMBER: 85-Q55001 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1100 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	25	25
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

Shortly after take-off, the ultralight pilot heard a loud noise, which was followed by a severe engine (Rotax 447) vibration, and a loss of engine power. The pilot attempted to return to the runway from which he had departed but was unsuccessful. He force-landed the aircraft into some small trees at the side of the runway, causing substantial damage to the aircraft.

The carburettor air filter had become detached in flight and had struck and damaged the pusher propeller. The damaged propeller caused the engine vibration, which resulted in the subsequent engine failure. The air filter is fastened to the carburettor air inlet by a jubilee clamp which had become loose. It could not be determined why the clamp became loose; however, there is no retaining flange or lip on the inlet to prevent the filter from becoming detached should the clamp loosen.

FINDINGS:

Cause Related:

1. The air filter retaining clamp became loose, and the air filter became detached, damaging the propeller.

2. The damaged propeller created an engine vibration which resulted in a loss of engine power.

3. During the forced landing, the aircraft struck the trees at the side of the runway.

Other:

1. The carburettor air inlet on this engine type has no flange or lip to prevent the filter from becoming detached should the clamp loosen.

SAFETY ACTION:

Action Taken:

Spectrum Aircraft Inc. issued Advisory No. 008, 04 March 1985, recommending safety wiring of the air filter to the engine. Their Advisory No. 041, 14 November 1986, makes safety wiring now mandatory.

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CHINOOK WT-II (Ultralight) C-IGIL
NAPIERVILLE, QUEBEC 1 mi E
10 MARCH 1985

REPORT NUMBER: 85-Q55002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Ultralight Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	200	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight was on its initial flight test following assembly. After reaching an altitude about 350 feet above ground level (agl), the pilot performed a few shallow turns and a stall. He then made two additional turns; the last turn to the left gradually increased into a steep turn, followed by a side-slip, and the ultralight struck the ground in a left-wing-down attitude. The pilot was fatally injured.

The weather was not considered to be a factor in this accident. The visibility exceeded 10 miles, and the wind was estimated at less than eight knots.

Examination of the wreckage revealed that the right-hand aileron lower bellcrank cable was disconnected. The slip pin, the clevis pin, and the clevis could not be located. These components provide the final connection between the aileron cable from the cockpit to the aileron horn on the wing. It could not be determined whether these components were omitted at the time of assembly or if they were subsequently removed during an adjustment to the tension of the right aileron cable system as requested by the pilot before the flight.

Wind tunnel testing of this type of wing has demonstrated that a disconnected aileron has a tendency to rise. The tests also showed that this wing is not rigid and that the down-going aileron causes the wing to twist downward. Similarly, the wing on the up-going side twists upward. When the aileron is deflected, the roll rate of the flexible wing is less than that of a rigid wing.

During the turn to the left near the end of the short flight, the right aileron lower cable became disconnected, causing an uncommanded rolling tendency to the right. Sensing this abnormal roll tendency, the pilot may have countered by the application of opposite rudder and aileron, which would result in a steeper banking turn, followed by a side-slip. The roll rate authority remaining with the disconnected aileron cable, coupled with the known wing twisting characteristics of the Chinook, was insufficient to enable the pilot to level the wings and recover the ultralight at such a low altitude above ground.

The following laboratory reports were completed: LP 79/85 - Safety Helmet Failure Analysis; LP 81/85 - Throttle Controlex Cable Failure Analysis; LP 84/85 - NRC Wind Tunnel Tests of Chinook Wing; and LP 80/85 - Duplication of Flight Video Cassette.

FINDINGS:

Cause Related:

1. The right-hand aileron lower cable became disconnected from the bellcrank in flight, causing a lateral control stability problem, during a turn at an altitude which did not provide the pilot sufficient height for recovery.

Other:

-Nil-

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Aviation Occurrence Reports

ROTEC ENGINE INC RALLY 3 (Ultralight) C-IEKY
NAPANEE, ONTARIO
13 MARCH 1985

REPORT NUMBER: 85-O55001 (Accident)
LOCAL TIME: 0930 EST
OPERATION: Private Ferry
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	70	30
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight was taking off from an ice-covered river. After taxiing upriver from the tie-down area, the pilot turned into wind and took off. Shortly after becoming airborne, the aircraft began a right turn. The pilot immediately applied full left spoileron and full left rudder in an attempt to stop the turn. Just as the ultralight started to respond to the control inputs, it struck a tree on the river-bank.

The river-bank, which is to the right of the aircraft take-off path, slopes upwards. The take-off was made into a 30-degree, 10-knot right cross-wind. The right cross-wind, which was flowing down over the river-bank, may have acted on the ultralight and caused the aircraft to turn right. When the pilot attempted to correct the right turn, the spoileron did not provide an immediate aerodynamic response, and the ultralight was slow to react to the control inputs.

The spoilerons on this type of ultralight are small. They act independently and are not as effective as an aileron system which not only decreases lift on one wing but simultaneously increases lift on the opposite wing.

FINDINGS:

Cause Related:

1. The flight controls were not effective enough to overcome the aerodynamic forces resulting from the right cross-wind.

Other:

- Nil -

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TERATORN TIERRA II (Ultralight) C-IEDS
DAAQUAM, QUÉBEC 2 mi W
23 MARCH 1985

REPORT NUMBER: 85-Q55003 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1645 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	30	21
LAST 90 DAYS	8	8

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

Following several touch-and-go landings, the pilot landed his ski-equipped ultralight in a northwest direction into wind, on an unpacked, snow-covered farm field. Half an hour later, the pilot taxied out for a take-off in a southeast direction with a light quartering tail wind. Although 1,500 feet of the field was usable, the pilot decided to begin his take-off with 1,000 feet of take-off run available. After lift-off, the pilot realized that the aircraft would not clear the obstacles at the end of the field, and he reduced the aircraft power and landed straight ahead. During the roll-out, the aircraft struck the side of a farm house.

During the disassembly of the engine, it was noticed that the clutch lining was worn to the rivets. When the clutch slips, the power produced by the engine is only partially applied to the propeller.

Because of a slipping clutch, the propeller did not deliver rated power during the take-off, and, as a result, the ultralight aircraft performance was considerably decreased. When he realized how poor the performance was, the pilot rejected the take-off.

FINDINGS:

Cause Related:

1. Because of a slipping clutch, the propeller did not deliver rated power during the take-off.

2. After the pilot had rejected the take-off because of the poor performance, the aircraft struck a building at the end of the field.

Other:
-Nil-

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MIRAGE (Ultralight) C-IACO
BERWICK, NOVA SCOTIA
11 MAY 1985

REPORT NUMBER: 85-A55002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1150 ADT
OPERATION: Private Recreational
DAMAGE: Minor
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	115	30
LAST 90 DAYS	6	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight was engaged in local recreational flying when the engine stopped. The pilot attempted to carry out a forced landing in a field. On approach, the main wheels of the ultralight snagged on the top wire of a fence at the perimeter of the field. The aircraft nosed over and came to rest at the edge of the field.

The engine lost power because of a corroded ignition lead inside the capacitor discharge ignition (CDI) unit. CDI units are sealed units and are not normally repaired, nor is repair recommended by the manufacturer. The CDI unit installed on this aircraft had been previously repaired at the point where the ignition lead attaches inside the unit. The unit had not been properly sealed after repairs; as a result, corrosion developed on the ignition lead.

FINDINGS:

Cause Related:

1. The repairs, which were carried out on the CDI unit and which were not recommended by the manufacturer, permitted corrosion to take place, rendering the unit unserviceable and causing the engine to lose power.

Other:
-Nil-

→ → → → →

ULTRAFLIGHT LAZAIR (Ultralight) C-IEYE
MEMRAMCOOK, NEW BRUNSWICK
18 MAY 1985

REPORT NUMBER: 85-A55003 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1145 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	20	20
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight pilot was preparing to depart on a cross-country flight from an unfamiliar field. During the take-off roll, the aircraft encountered some bumps in the field and bounced into the air. The aircraft rolled to the right, and the pilot applied full left aileron but was unable to recover. The right wing struck the ground, and the aircraft slid to a stop in a small river adjacent to the runway.

The pilot of the aircraft was making his second attempt at a take-off that day. He rejected his first attempt when he determined that there was insufficient runway length remaining to complete the take-off roll. When the decision to reject was made, there was insufficient distance remaining to stop the aircraft on the existing runway, and the aircraft rolled down a six-foot gradual embankment. As the aircraft was coming to rest at the bottom of the embankment, the lower frame of the fuselage struck a small mound, causing six rivets on the aileron control shaft to be sheared. This damage, unknown to the pilot, rendered the aileron control ineffective. Because the aileron control was damaged during the previously rejected take-off, the pilot did not have lateral control when the aircraft became airborne. As a result, the pilot was unable to recover when the aircraft rolled to the right after take-off.

FINDINGS:

Cause Related:

1. Because the aileron control was damaged during a previously rejected take-off, the pilot did not have lateral control when the aircraft became airborne.

Aviation Occurrence Reports

Other:

-Nil-

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LET BLANIK L-13 (Glider) C-GPKT

ROCKTON, ONTARIO

19 MAY 1985

REPORT NUMBER: 85-O/50033 (Accident)

INFORMATION SOURCE: Field Investigation

LOCAL TIME: 1520 EST

OPERATION: Private Recreational

DAMAGE: Substantial

PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	155	35
LAST 90 DAYS	3	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was flying the glider from the back seat with a passenger in the front seat on a local familiarization flight. Surface winds were down the runway at 15 knots with gusts to 23 knots. On final approach, the glider was high, and the pilot extended the spoilers. The glider had not yet cleared the trees on final approach when it began to sink rapidly, and the left wing struck a tree about 10 feet below the top. The glider yawed left, descended steeply, and the right wing tip struck the ground about 50 feet beyond the base of the trees, coming to rest about 500 feet from the end of the runway.

When the pilot turned final, he was high in anticipation of a steep glide angle into the strong head wind. On final, he felt that if he did not extend the spoilers he would land long. He extended the spoilers to lose the excess height.

The pilot had misjudged his height. The strong head wind and extended spoilers resulted in an increased rate of descent, and the glider undershot the runway and collided with a tree. When the glider is flown from the rear seat there is some restriction in the forward visibility available to the pilot. Although the pilot thought he was clear of the trees, with the restricted forward visibility, he did not notice the tree in time to avoid the collision.

FINDINGS:

Cause Related:

1. The pilot misjudged his height, extended the spoilers, and, as a result, undershot the runway, and the aircraft collided with a tree on final approach.

2. The pilot flying from the rear seat had restricted forward visibility and, as a result, did not see the tree in time to avoid it.

Other:

-Nil-

→ → → → →

RAND KRI (Amateur-built) C-GBYH

ST-JEAN AIRPORT, QUEBEC

26 MAY 1985

REPORT NUMBER: 85-Q50012 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 1037 EDT

OPERATION: Private Recreational

DAMAGE: Substantial

PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	100	8
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

After a flight lasting about 50 minutes, the pilot landed his amateur-built aircraft on runway 06 of the St-Jean Airport. The aircraft bounced twice then began its landing roll. The pilot suddenly heard a dry cracking sound, and the landing gear collapsed. The propeller shattered on the runway, and the aircraft came to a stop a few moments later after travelling a short distance on the wheels, which were still projecting below the wings.

This aircraft is equipped with a tail-wheel type retractable landing gear which is manually operated. A lever equipped with a handle acts directly on a pivoting rod to which the left and right landing gear struts are attached. The rear wheel is not retractable. The up and down positions are locked by means of plungers depressed by springs. The plungers can be released by a cable operated by a trigger on the landing gear handle. These locks, which are attached to the landing gear rod by aluminum supports, engage into fittings built into the

cabin for the purpose of keeping the gear in the up or down position. The locks are designed to resist stress when the aircraft is resting on the extended gear. If the aircraft lands with the gear retracted, the landing stresses are exerted principally on the locking plungers rather than on the landing gear structure. The investigation established that this aircraft had made a wheels-up landing a few months prior to this accident. The stresses on the landing gear locks had caused a permanent distortion of the plunger supports sufficient to weaken them but not to cause failure. Examination of the supports showed that the right support failed at the time of the accident and that the left support was twisted, thus permitting the landing gear to retract.

The evidence is that landing gear locks failed after the aircraft bounced on the runway because they had been distorted and weakened during a previous wheels-up landing.

FINDINGS:

Cause Related:

1. The landing gear locks were weakened during a previous wheels-up landing.
2. During this accident, the weakened landing gear locks failed when the aircraft bounced on landing.

Other:

-Nil-

→ → → → →

BEAVER RX550 C-IETL
LAC ROUGE, QUEBEC
28 MAY 1985

REPORT NUMBER: 85-Q55004 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 2030 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (Ultralight)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	60	60
LAST 90 DAYS	40	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot intended to practise landings on water with his amateur-built aircraft. As he began to round out, the front end of the left float struck the water surface, and the aircraft pivoted 180 degrees. The left float and the nose of the aircraft were damaged.

During the landing which was conducted under glassy water conditions, the pilot looked ahead in order to estimate his height. Because darkness had just fallen and the aircraft was a long way from the shore, the pilot had no lateral reference points. When he estimated that his height was 20 feet, the pilot began to round out, but the left float struck the water surface, and the aircraft pivoted 180 degrees.

FINDINGS:

Cause Related:

1. During a landing under glassy water conditions, the pilot had no lateral reference points because darkness had just fallen and he was a long way from the shore.
2. At the beginning of the round-out, when the pilot believed that he was 20 feet above the surface, the left float struck the water, and the aircraft pivoted 180 degrees.

Other:

-Nil-

→ → → → →

Aviation Occurrence Reports

DIGBY SPORT FLIGHT LTD.
ULTRALIGHT SOARING WIZARD T388
(Ultralight) C-IARO
BRIGHTON SHORE, NOVA SCOTIA
28 MAY 1985

REPORT NUMBER: 85-A55004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1930 ADT
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	300	90
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight aircraft was on the last leg of a short cross-country training flight. As power was added for a climb, the instructor and student heard a pinging noise and felt a severe vibration. They observed a loose propeller shaft bearing hanger and turned toward a nearby field. Shortly thereafter, the propeller drive shaft assembly dislodged, and, as a result, engine power could no longer be supplied to the propeller. The instructor attempted a forced landing onto the field, but high trees on the approach prevented a normal descent. The aircraft overshot the field, and the instructor deliberately stalled the aircraft into some trees at the edge of the field.

The ten bolts in the engine rail, including those which secure the propeller shaft bearing hangers, were unevenly torqued. This resulted in an excessive load being carried by one of the bearing hanger bolts, which caused it to fail. The subsequent vibration of the engine rail resulted in the failure of further bolts, allowing the propeller drive shaft to dislodge. The engine, drive shaft assembly, and engine rail are factory assembled; however, there are no specific inspection instructions provided by the manufacturer for the engine rail bolts. The torque settings on the bolts had never been checked by the aircraft operator.

FINDINGS:

Cause Related:

1. The failure of the improperly torqued engine rail and propeller shaft bearing hanger bolts resulted in the propeller drive shaft becoming disconnected; as a result, power to the propeller was interrupted.

Other:
-Nil-

→ → → → →

COOT A C-GLOO
LAC BLANC, QUÉBEC
02 JUNE 1985

REPORT NUMBER: 85-Q50020 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1700 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	300	30
LAST 90 DAYS	12	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

After spending most of the day fishing, the pilot and his passenger departed Lac Albert for Lac Blanc, about twelve kilometres away, to refuel. During a low-level flight, the pilot noted that Lac Blanc was rougher than the lake he had just left. He decided to attempt a landing while remaining ready to overshoot and land his amphibious aircraft on the runway at the La Tuque Airport. Just before the aircraft touched the water, the pilot initiated an overshoot, but the waves struck the hull and caused the aircraft to pivot. It stalled and dropped onto the lake in an upright position. The force of the impact caused the hull to burst open, and the aircraft sank up to its engine.

At the time of the accident, the wind measured at the La Tuque Airport, about 50 kilometres away, was southwesterly at 14 knots, gusting from 22 to 32 knots. However, the wind in the accident area was passing through a valley running southwest/northeast which created a venturi effect and therefore increased the wind speed. The lake which the amphibious aircraft had just left was not affected by such a strong wind because there was no venturi effect there. That lake was also smaller, and the waves were therefore lower.

All the indications are that, although the pilot overflew the intended landing area and noted that the water was very rough, he did not expect such a difference between the conditions on the lake he had just left and the one on which he was preparing to land. He attempted the land-

ing; however, when he realized that the waves were too high he did not initiate an overshoot early enough.

FINDINGS:

Cause Related:

1. Because of the venturi effect and the large area of the lake, the waves in the intended landing area were higher than those on the lake that the pilot had just left.

2. The pilot initiated an overshoot too late when he realized that the waves were too high for his amphibious aircraft.

3. The waves struck the aircraft and caused it to pivot; it stalled and dropped onto the lake in an upright position, causing the hull to burst open.

Other:

-Nil-

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CLUB DE VOL A VOILE DE QUEBEC
BLANICK L-13 (Glider) CF-FYR
ST-RAYMOND AIRPORT, QUEBEC
02 JUNE 1985

REPORT NUMBER: 85-Q50017 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1645 EDT
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	235	22
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The glider was being towed by a tow plane for a local training flight. On the take-off roll, the glider's dive brakes were observed to deploy. During the climb, the glider was below the tow plane. The glider pilot applied back pressure to bring the glider back in line with the tow plane. At a height of about 150 feet above ground level (agl), the weak link broke, releasing the glider from the tow plane. The pilot maintained back pressure on the control stick for some time after the release. The glider then entered a steep turn to the right. The pilot ap-

plied control inputs in an attempt to counteract the rolling motion, but the glider struck the ground in a nose-down, steeply banked attitude. It then cartwheeled and came to rest in an inverted position. The pilot was seriously injured.

Examination of the wreckage did not reveal any pre-existing structural or mechanical deficiencies. The tow rope and weak link met the proper specifications. The weak link, which is positioned between the tow rope and the glider, is designed to break under a tension lower than the minimum strength requirement of the tow rope. The aircraft had taken off in a westerly direction, and the wind at the time was blowing from the southwest at 10 gusting to 15 knots.

The pilot extended and retracted the dive brakes before starting the take-off roll. The dive brakes are operated by means of torque rods, levers, and push rods. The dive brakes can be secured only when they are in the retracted position. Once in this position, the dive brake handle has to be inserted into a slot for locking. If the handle is not locked or manually held in position, the dive brakes creep out as the airspeed increases.

The inadvertent deployment of the dive brakes during the take-off roll increased the tension load on the cables. The extension of the dive brakes caused a decrease in lift, and, as a result, the glider descended below the tow plane. The application of back pressure to bring the glider in line with the tow plane increased the drag which, in turn, further increased the tension on the rope. Also, the wind conditions created a temporary load which increased the tension on the tow cable to the point that the tension exceeded the minimum strength requirement of the weak link, which then broke. As the pilot did not lower the aircraft nose, the speed of the glider rapidly decreased, and the aircraft stalled and rolled to the right. Control inputs by the pilot and the proximity of the glider to the ground did not allow recovery.

The following laboratory report was completed: LP 271/85 - Sailplane Weak Link Failure Analysis.

FINDINGS:

Cause Related:

1. The dive brakes were not secured in the retracted position.

2. The opening of the dive brakes increased drag to the point where the tension exceeded the limits, and the weak link broke.

Aviation Occurrence Reports

3. The pilot did not lower the aircraft nose, causing the aircraft to stall and roll at an altitude which did not allow recovery.

Other:
- Nil-

→ → → → →

FUN FLIGHT REG'D
SKYSEEKER MKIII (Ultralight Amateur-built)
C-IFFS
COBDEN, ONTARIO
08 JUNE 1985

REPORT NUMBER: 85-O55007 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0917 EDT
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5	5
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot was conducting his first solo flight in the ultralight aircraft, and his instructor was monitoring the flight from the ground. Shortly after take-off, the airspeed stopped increasing, and the aircraft was not gaining altitude. In an attempt to increase the airspeed, the pilot lowered the nose of the aircraft. When the airspeed increased slightly, he raised the nose to a climb attitude, and, almost immediately, the airspeed decreased, and the aircraft stopped gaining altitude. This attitude change was repeated three or four times without any altitude gain.

Unable to land straight ahead because of trees, the pilot turned the aircraft downwind to return to the airstrip for a landing. During the turn, the aircraft descended and struck the ground.

The aircraft was being flown in a nose-high attitude at low speed, and the effects of the turn caused it to stall. There was insufficient altitude in which to recover before the aircraft struck the ground.

FINDINGS:

Cause Related:

1. The pilot repeatedly placed the ultralight in a nose-high attitude which resulted in the aircraft being unable to gain airspeed or altitude.

2. While near the stall speed, the pilot turned the aircraft downwind in an attempt to return to the airfield; this manoeuvre caused the aircraft to stall.

Other:
- Nil-

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RALLY 2B (Ultralight) C-IIIH
MIDDLE STEWACKIE, NOVA SCOTIA 8 mi E
15 JUNE 1985

REPORT NUMBER: 85-A55006 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1145 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	36	18
LAST 90 DAYS	8	8

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was flying the ultralight on a cross-country flight in turbulent conditions. After an hour of flight, the pilot began to feel airsick, and he carried out a successful precautionary landing onto a field. Eventually, he felt better and decided to continue his flight. The field was covered with tall grass, and the pilot selected a take-off path into wind on an area of the field where the grass was the shortest. On lift-off, the right wing lifted first, and the left wing caught in the grass. The aircraft ground looped through 135 degrees and came to rest on its nose.

Although the pilot was concerned about the height of the grass, he decided to attempt the take-off because he was close to his destination, and he did not want to have to dismantle his aircraft. Although the pilot selected an area for take-off where the grass was the shortest, the grass was still too high for safe aircraft operation.

FINDINGS:**Cause Related:**

1. The pilot used a field that was unsuitable for take-off, and, as a result, the aircraft ground looped.

Other:

- Nil -

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AIR CADET LEAGUE OF CANADA
SCHWEIZER 233 (Glider) C-FDUH
GENTILLY, QUÉBEC
15 JUNE 1985

REPORT NUMBER: 85-Q50026 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 EDT
OPERATION: Flying Club Recreational
DAMAGE: Substantial
PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	19	19
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The glider left the training area to the north of the airfield at 700 feet above ground level (agl) and was proceeding on base leg to land on runway 06. Before arriving over the runway, the pilot began a gentle left turn at 100 feet agl over the runway to line the glider up with the runway centre line. The glider overshot the runway laterally and struck some trees off the right side of the runway. The glider came to rest in the trees in a nose-down attitude.

This was the fourth flight of the day for this pilot. All three previous flights had been made using a training area to the south. Changing wind conditions had necessitated a change to the north training area, which resulted in a 180-degree change in base leg heading. This meant that there was now a 10- to 15-knot tail wind on base leg. Although there was a wind sock at the airfield, it was not serviceable at the time of the accident. Examination of the glider after the accident revealed that the spoilers were deployed at the time of impact. The pilot could recall that he had used the spoilers on base leg because he was too high.

The tail wind condition and the base leg which would not extend further than the threshold required the pilot to use spoilers throughout most of the base leg in order to increase the aircraft's rate of descent. Considering the wind conditions, the pilot did not begin his final turn soon enough, and, as a result, the glider overshot the runway. A retraction of the spoilers at this point would have greatly reduced the glider sink rate and may have enabled the pilot to correct to the landing area.

FINDINGS:**Cause Related:**

1. The pilot misjudged his final turn, and, as a result, the glider overshot the landing area.

2. When the glider overshot, the pilot did not retract the wing spoilers, thereby preventing any possibility of correcting to the landing area.

Other:

1. Although a wind sock was installed at the airfield, it was not serviceable.

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WOODSTOCK (Homebuilt glider) C-GBXM
ROXTON FALLS, QUEBEC
22 JUNE 1985

REPORT NUMBER: 85-Q50027 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1350 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	133	6
LAST 90 DAYS	5	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was making his first flight of the season in the Woodstock glider. After being released at 3,000 feet and at about three kilometres north of the airfield, the pilot made some ascents by taking advantage of rising thermals. On his return toward the airstrip, he encountered strong downdrafts. Since he could not reach his base, he carried out an off-airfield landing on a road. Before it could be stopped, the glider struck a car, which the pilot

Aviation Occurrence Reports

had not seen coming from the opposite direction. After the wing tip struck the automobile windshield, the glider pivoted 180 degrees to the left and came to rest on the road, about half a mile northeast of the airfield.

As the pilot was preparing to make this first flight, a more experienced pilot suggested that he fly further to the north because, according to this pilot, the soaring conditions there were better than those prevailing in the shorter circuit initially planned by the young pilot. After a few manoeuvres in rising thermals, the pilot descended toward the airfield; he was then between 1,800 and 2,000 feet above ground level. This height, combined with the aircraft's lift/drag ratio of 30 and a light cross-wind, would normally have enabled the pilot to reach the airfield, which was about three miles away. As the aircraft approached its destination, it encountered a downdraft which resulted in a sink rate of 800 feet per minute. When he selected the landing place, the pilot did not see the automobile on the road. During the landing run, he saw the vehicle rounding a turn.

The pilot allowed himself to be persuaded by another more experienced pilot to carry out manoeuvres further away than he initially intended. Consequently, he did not maintain a sufficient altitude reserve to ensure that he would be able to return to the airstrip even under the worst conditions. The altitude reserve was soon used up in the downdrafts, and the pilot was forced to make an off-airfield landing.

FINDINGS:

Cause Related:

1. The glider pilot allowed himself to be persuaded by another pilot to carry out manoeuvres further away than he initially intended.
2. Since he did not have a sufficient altitude reserve to ensure that he would be able to return to the airstrip even under the worst conditions, the pilot was forced to make an off-airfield landing after encountering downdrafts.
3. During the landing on the road, the glider struck an automobile which the pilot had not seen when he was selecting a landing place.

Other:

-Nil-

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SPEZIO TUHOLER (Amateur-built) C-FBWC
MOUNT PLEASANT, PRINCE EDWARD ISLAND
1 JULY 1985

REPORT NUMBER: 85-A50017 (Accident)

INFORMATION SOURCE: Correspondence Investigation

LOCAL TIME: 1540 ADT

OPERATION: Private Training

DAMAGE: Substantial

PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	186	6
LAST 90 DAYS	4	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot had completed several successful touch-and-go landings in his amateur-built aircraft at a private paved strip. The approach to the runway was bordered by numerous trees, and the wind was 40 degrees to the runway at 11 knots. As the aircraft approached the touch-down area for another landing and descended below the tree line, it unexpectedly dropped and landed hard on the runway. The landing gear collapsed, and the aircraft slid to a stop.

It is likely that the velocity of the wind immediately above the runway threshold was changed by the shielding effect of the adjacent trees. The pilot did not anticipate this wind shear and was unable to prevent the aircraft from landing heavily on the runway. The hard landing caused the nose gear to collapse. The pilot had only flown 6 hours total on type with 2.2 hours in the past 90 days and was still familiarizing himself with the aircraft handling characteristics.

FINDINGS:

Cause Related:

1. The combination of wind conditions and pilot unfamiliarity with the aircraft type created a situation in which the aircraft was landed heavily and the landing gear collapsed.

Other:

- Nil -

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FISHER FLYING FP-101 (Ultralight) C-IJML
MCEWEN FIELD, NEW BRUNSWICK
5 JULY 1985

REPORT NUMBER: 85-A55005 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2100 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,000	0
LAST 90 DAYS	30	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The amateur-built ultralight aircraft was on a test flight to determine if an additional frame installed in the fuselage cockpit would serve to strengthen the forward wing attachment points. Following take-off, at an altitude of 25 feet above ground, and as the power was reduced for cruising flight, the ultralight commenced a turn to the right. The application of left aileron failed to stop the turn, so the pilot closed the throttle in an attempt to land. The turn stopped when the power was reduced, but the ultralight unexpectedly stalled. There was insufficient altitude to complete a stall recovery; the ultralight struck the ground in a nose-low attitude, and nosed over.

Post-accident examination revealed that the general construction and assembly of the ultralight were well below acceptable amateur-built standards. The ailerons were improperly rigged, and the right aileron was installed one-half inch above the upper surface of the wing. The rudder was offset to the right and was not aligned with the vertical stabilizer. Both of these conditions will create asymmetric drag which would result in a turn to the right. A weight and balance had not been completed after the installation of the additional frame; however, because of the damage resulting from the accident, it could not be determined whether the centre of gravity was within limits. Both the initial construction and the subsequent modifications were carried out by the owner.

FINDINGS:

Cause Related:

1. Improper installation and rigging of the ailerons and rudder reduced the lateral and directional stability of the

ultralight, and, as a result, the pilot was unable to maintain control of the aircraft.

2. The overall construction of the ultralight was well below acceptable standards.

3. An aircraft weight and balance calculation was not carried out following structural modification of the ultralight's airframe.

Other:

-Nil-

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EIPPER QUICKSILVER MXII (Ultralight) C-IAYE
LAKEFIELD, ONTARIO 2 mi N
13 JULY 1985

REPORT NUMBER: 85-O55011 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1030 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	135	25
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	2	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight took off from a farmer's field with an instructor and student on board. The field was bordered by trees, and there was a strong gusty wind from the left. During the climb-out, the engine (Bombardier - Rotax 503) experienced momentary losses of power. Shortly after, the right wing dropped suddenly, and the ultralight entered a steep turn to the right. The instructor pilot applied left rudder, full aft stick, and left spoiler but was unable to recover. The right wing hit the ground first, and the ultralight flipped over on its back.

The wind on the day of the accident was gusty and strong enough to affect the performance of the ultralight. The cross-wind would have been blanked out by a line of trees adjacent to the field, until the ultralight reached an altitude of 50 to 100 feet agl. A gust of wind lifted the left wing and, combined with the reduced performance of the engine, caused the ultralight to stall and enter a spin to the right. The pilot's input of full aft stick

would have maintained the stalled condition until impact.

FINDINGS:

Cause Related:

1. After take-off, the ultralight's engine experienced momentary losses of power.
2. At about 50 to 100 feet agl, the ultralight entered an area of wind shear which caused the aircraft to stall, and the aircraft entered an uncontrolled descending turn until it struck the ground.
3. The pilot employed incorrect control inputs in his attempt to recover from the stall.

Other:

-Nil-

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SCHEMPP-HIRTH AUSTRIA (Glider) C-FPDM
CHIPMAN AIRPORT, ALBERTA 1 mi E
14 JULY 1985

REPORT NUMBER: 85-W50036 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1750 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	110	85
LAST 90 DAYS	40	38

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The glider pilot had almost completed a cross-country flight to qualify for one of the tasks of the Diamond Achievement Award. However, as the thermals were dying out and the aircraft was descending, the pilot decided to attempt a landing onto a field. During the turn to final, the glider entered an incipient spin. The pilot stopped the spin, but the aircraft was too low to permit a full recovery, and the glider struck the ground in a nose-down attitude. The aircraft bounced back onto the tail, snapping the rear fuselage in half.

The pilot was attempting this task for the second time. The task consisted of a flight to a point 300 kilometres away with return to destination without any stop. The pilot's first attempt had been disallowed because the turning point photograph was ruined in developing. For the occurrence flight, the pilot was carrying food and a litre of water. All the water was consumed at an early stage of the flight. The time from take-off to the time of the occurrence was about six hours.

The pilot, disappointed by the failure of his first attempt, was feeling a strong pressure to complete the last few kilometres. He had been in the air six hours and had run out of water several hours earlier; as a result, he was suffering from fatigue which, in turn, affected his judgement. As the evening was approaching, he ran out of thermals, but he was so close to destination that he allowed the aircraft to fly low and slow. When he was committed to land, the pilot did not realize how slow his aircraft was, and entered a spin in the turn to final. The aircraft was too low to effect a recovery.

FINDINGS:

Cause Related:

1. Fatigue, thirst, and compulsion to succeed affected the pilot's judgement when the glider was very close to destination.
2. The thermals were dying out, and the pilot let the aircraft fly low and slow in an attempt to reach his destination.
3. When the pilot was committed to a landing, the turn to final was made at a slow airspeed, and the glider entered a spin from which a recovery could not be made.

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SONERAI II (Amateur-built) C-GIWT
LILLOOET AIRPORT, BRITISH COLUMBIA
21 JULY 1985

REPORT NUMBER: 85-P50032 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1545 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,000	97
LAST 90 DAYS	7	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

While the aircraft was in cruising flight near the town of Lillooet, British Columbia, the pilot noticed that the aircraft's fuel supply had depleted faster than normal. He decided to carry out a precautionary landing, and he turned the aircraft toward the nearby airport. During the approach, the aircraft's engine ran erratically at first and then stopped altogether. As the aircraft glided toward the runway, the right wing contacted a tree, and the aircraft struck the ground in a nose-down attitude.

Following the accident, there was sufficient fuel remaining in the tank to sustain flight for approximately one hour. The gascolator to carburettor fuel supply hose was found disconnected at the carburettor inlet. The polyethylene hose did not have a securing device and had slipped off the nipple of the carburettor. Examination of the engine determined that it was capable of producing power.

Although the aircraft had taken off with a full tank of fuel, the pilot noticed a lower than normal quantity remaining after only 20 minutes of flight. This rapid depletion of the tank's quantity resulted from the unsecured fuel supply hose slipping off the nipple of the carburettor during flight. As the fuel supply ran unused into the engine cowl, the engine began to run erratically at first, and it then stopped altogether.

FINDINGS:

Cause Related:

1. Engine stoppage was due to fuel starvation as a result of the unsecured fuel supply hose slipping off the nipple at the carburettor.

Other:
-Nil-

→ → → → →

OSPREY 11 (Amateur-built) C-GSMP
SAINT JOHN AIRPORT, NEW BRUNSWICK
24 JULY 1985

REPORT NUMBER: 85-A50022 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2000 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,210	11
LAST 90 DAYS	11	11

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was flying circuits as part of a series of familiarization flights on his recently constructed aircraft. When the aircraft was on final, the pilot lowered the landing gear but was unable to get the landing gear selector lever into the down-and-locked position. The pilot cycled the landing gear and, this time, was successful in moving the selector lever to the down-and-locked position, although it required more force than normal. A landing was carried out, and, during the landing roll, the right landing gear collapsed.

This aircraft had been involved in a previous accident on 4 June 1985, during which the actuating rod for the right landing gear broke, causing the right gear to collapse on touchdown. The pilot reported that, during the period in which he was familiarizing himself with the aircraft, he had landed hard on a couple of occasions.

The right-hand bellcrank assembly consists of the bellcrank arm, the bellcrank axle, and the retraction link. The bellcrank axle was found to have considerable deformation of the bolt holes and some twisting of the axle in the area of the bolt holes. The damage to the axle reduced the angle formed by the bellcrank arm and the retraction link, thereby preventing the retraction link from being placed in the overcentre position required to lock the gear down. The damage to the axle was consistent with that caused by repeated applications of a heavy load such as would occur during several hard landings.

FINDINGS:

Cause Related:

1. The elongation of the bolt holes and the twisting in the bellcrank axle as a result of previous hard landings prevented the retraction link from being placed in the overcentre position required to lock the right gear down.

Other:

-Nil-

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CHINOOK WT-II (Ultralight) C-IBEN
NAPIERVILLE, QUEBEC 2 mi E
27 JULY 1985

REPORT NUMBER: 85-Q55007 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1520 DST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10	10
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight pilot was ground testing his aircraft before flight. He had carried out several high-speed taxi tests, and, during the last of these, he inadvertently became airborne and proceeded to carry out an approach to an adjacent field. During the approach, the pilot reduced power, and the nose of the ultra- light pitched down. He reapplied power but was unable to recover before the aircraft struck the ground; the pilot was seriously injured.

The field used was adequate for the operation of the ultralight. A deep ditch was located at one end of the field. Weather was not a factor in the accident.

The pilot had just resumed his training by taking a 40-minute dual flight after a lay-off of several months. The pilot held a student pilot licence but was not under the supervision and direction of an instructor.

The pilot was taxiing the aircraft at an excessive speed, and he allowed the aircraft to become airborne. Once airborne, he was unable to land on the same field because

of the ditch, and he elected to attempt a landing onto the adjacent field. During this attempt, he allowed the airspeed to decay until the ultralight stalled; there was insufficient height to effect a recovery, and, as a result, the aircraft struck the ground. It is probable that the pilot's low experience level combined with his recent period of flying inactivity contributed to his inability to handle the landing attempt. The pilot was not authorized to attempt the taxi exercise.

FINDINGS:

Cause Related:

1. While conducting a high-speed taxi test, the pilot inadvertently allowed the ultralight to become airborne.

2. During the subsequent landing attempt, the pilot allowed the airspeed to decay until the ultralight stalled and crashed.

Other:

-Nil-

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RAVEN S60A (Balloon) C-GULS
METCALFE, ONTARIO 1 mi SE
08 AUGUST 1985

REPORT NUMBER: 85-O50061 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1910 EDT
OPERATION: Private Recreational
DAMAGE: Minor
PILOT LICENCE: Free Balloon

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	75	53
LAST 90 DAYS	46	45

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	1	3

SUMMARY REPORT:

The balloon lifted off in light northwesterly winds. About 30 minutes into the flight, the balloon encountered strong and cold northerly winds which caused an uncontrollable climb. The pilot decided to land, and, during the final approach, the balloon was again subjected to strong northerly winds. The pilot had difficulty controlling the balloon throughout the landing and was flipped out of the basket. The balloon came to rest in a creek bed. One passenger suffered a broken ankle. None

of the occupants was wearing any form of securing equipment or head protection.

According to the aerodrome forecast, the weather at launch time was considered suitable for the flight; however, the Ottawa area weather radar painted a large zone of thunderstorms located approximately 25 statute miles to the northeast of the landing site. The balloon was adversely affected by the cold downdrafts diverging outward from the cumulonimbus clouds.

The pilot had phoned the Ottawa Airport weather office prior to the flight and obtained the terminal forecast.

FINDINGS:

Cause Related:

1. The airborne balloon encountered strong winds not expected by the pilot, and the pilot decided to land.
2. On landing, gusty surface winds caused the basket to bounce across the ground several times before coming to rest.
3. The pilot was flipped out of the basket prior to the balloon coming to rest.
4. None of the occupants was wearing any form of securing equipment.

Other:

-Nil-

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MIRAGE (Ultralight) C-IACO
LONE PINE FARM, BERWICK, NOVA SCOTIA
10 AUGUST 1985

REPORT NUMBER: 85-A55007 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1115 ADT
OPERATION: Private Testing
DAMAGE: Destroyed
PILOT LICENCE: Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	128	33
LAST 90 DAYS	9	9

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was carrying out a test flight on his ultralight aircraft following an engine overhaul. Following the first circuit and while on approach, the pilot initiated a go-around because of unfavourable cross-wind conditions. On climb-out, at 100 feet above the ground, the engine (Kawasaki 440 A) began to lose power, and the engine rpm decayed. The pilot was unable to regain full engine power and force-landed into some high trees adjacent to the airstrip.

The engine lost power because of a corroded ignition lead inside the capacitor discharge ignition (CDI) unit. CDI units are sealed units and are not normally repaired, nor is repair recommended by the manufacturer. The CDI unit installed on this aircraft had been previously repaired at the point where the ignition lead attaches inside the unit. The unit had not been properly sealed after repairs; as a result, corrosion developed on the ignition lead.

The following laboratory reports were completed: LP 185/85 - Throttle Cable Shield and LP 186/85 - Fuel Sample Analysis and Technical Report - Capacitor Discharge Ignition Unit Analysis.

FINDINGS:

Cause Related:

1. The repairs, which were carried out on the CDI unit and which were not recommended by the manufacturer, permitted corrosion to take place, rendering the unit unserviceable and causing the engine to lose power.

Other:

-Nil-

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ULTRAFLIGHT LAZAIR (Ultralight) C-IAAQ
STANLEY AIRPORT, NOVA SCOTIA
13 AUGUST 1985

REPORT NUMBER: 85-A55008 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 0850 ADT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	300	7
LAST 90 DAYS	6	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight pilot was practising touch-and-go landings. On the first two landings, there was a light cross-wind from the left. By the time the third touch-and-go was attempted, the wind speed had increased and had become gusty. Just after lift-off, an unexpected gust of wind caused the ultralight to roll to the right. The pilot lost lateral and directional control of the aircraft, and the right wing struck the ground. The aircraft cartwheeled and came to rest in an inverted attitude.

Ultralight flying requires that wind speed and direction be closely monitored. There are no limits as such, and ultralight operators usually set their own limits based on their level of experience. The change in wind conditions in this case should have been a warning to the pilot to discontinue the exercise. The take-off was attempted in wind conditions which probably approached or exceeded the capabilities of the ultralight, and the pilot could not maintain control of the aircraft.

FINDINGS:

Cause Related:

1. The pilot did not monitor closely enough, nor fully consider, the changing wind conditions during the flight.
2. When the take-off was attempted in these conditions, the pilot was unable to maintain control of the aircraft.

Other:

-Nil-

→ → → → →

BEAVER RX 550 (Ultralight) C-IDPK
SURREY, BRITISH COLUMBIA
15 AUGUST 1985

REPORT NUMBER: 85-P55006 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2045 PDT
OPERATION: Private Recreational
DAMAGE: None
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	55	55
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was on a pleasure flight. After being airborne for a few minutes, the pilot set the aircraft down on a road between two farm fields. The pilot disembarked on the left side without shutting the engine down and walked aft into the rear-mounted propeller. The pilot sustained head and eye injuries.

The pilot was concerned with the quality of the aircraft assembly. He reported hearing a strange noise and landed to investigate further. Overly concerned with examining the aircraft, he disembarked without shutting down the engine and walked into the propeller. The pilot was wearing a helmet but sustained serious injuries when he was struck from below with an upcoming propeller blade.

Examination of the ultralight determined that the fabric wing covering was not as taut as it should have been. Also, a peg and grommet on top of the wing did not line up as specified by the manufacturer. It could not be determined if these deficiencies in assembly were the source of the reported noise.

FINDINGS:

Cause Related:

1. The pilot although concerned with the quality of assembly of the aircraft departed on a pleasure flight.
2. After hearing a noise, the pilot landed to examine the aircraft.

3. The pilot disembarked the aircraft without shutting the engine down and walked into the propeller.

Other:
-Nil-

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CHINOOK 2S C-IJIT
YARROW, BRITISH COLUMBIA
25 AUGUST 1985

REPORT NUMBER: 85-P55007 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0855 PDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	15,000	40
LAST 90 DAYS	150	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

While flying circuits the student pilot landed heavily and the ultralight began porpoising. The instructor took control and applied full throttle to go-around; however, the engine did not respond and a forced landing was made in a nearby field.

Engine examination at an overhaul shop revealed that both the compression rings were seized, allowing some of the gasses to blow by the piston during the compression stroke, thus accounting for a partial power loss. The cause of the compression rings seizing was not determined.

FINDINGS:

Cause Related:

1. Seized compression rings resulted in a partial power loss during the application of full throttle for a go-around.

Other:
-Nil-

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SKYLARK 43-3B (Glider) C-FZDJ
PENDLETON, ONTARIO
1 SEPTEMBER 1985

REPORT NUMBER: 85-O50069 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1722 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	79	7
LAST 90 DAYS	10	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was practising a confined area landing at the airport. During the final stage of the approach and before the aircraft was flared for touchdown, the right wing lightly brushed tree-tops located near the edge of the field. Approximately 12 feet above ground, the left wing tip struck bushes. The aircraft yawed left about 100 degrees and contacted the ground in a left-wing-low, nose-down attitude.

The investigation determined that the pilot had misjudged his altitude during the final approach, and when the left wing tip contacted the bushes, directional control was lost.

FINDINGS:

Cause Related:

1. The pilot misjudged his altitude on final approach, and, as a result, the left wing tip struck the bushes, causing the loss of directional control.

Other:
- Nil -

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Aviation Occurrence Reports

LAZAIR 1 (Ultralight) C-IIIC
MEMRAMCOOK, NEW BRUNSWICK
05 SEPTEMBER 1985

REPORT NUMBER: 85-A55009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1920 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11	11
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was on a local pleasure flight when he decided to practise a stall. As the power was reduced before entering the stall, the right engine (Rotax) lost complete power, and the pilot started a left turn toward the nearest field. He pulled the start cord on the right engine three times; however, the engine would not restart. The aircraft descended in the left turn and touched down in a clearing short of the intended landing field, coming to rest in trees at the edge of the clearing.

After the accident, the right engine was started and it ran normally. It could not be determined why it had failed. The aircraft is capable of maintaining altitude on one engine, but only while flying either straight ahead or in a shallow turn toward the dead engine. Any turn toward the live engine will result in the aircraft descending.

Although other fields were available and suitable for a landing, the pilot elected to turn left toward the nearest field. The asymmetric power opposed the left turn and resulted in a high drag. The descent profile was too steep for the aircraft to reach the field.

FINDINGS:

Cause Related:

1. The right engine failed for undetermined reasons.
2. The pilot chose to turn left toward a nearby field.
3. The asymmetric thrust opposing the left turn led to high drag on the aircraft.

4. The resultant descent profile was too steep for the aircraft to reach the field.

Other:
-Nil-

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UNIDENTIFIED (Amateur-built) UNREGISTERED
ST-ALBERT-DE-WARWICK, QUEBEC
07 SEPTEMBER 1985

REPORT NUMBER: 85-Q50054 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1135 EDT
OPERATION: Private Testing
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	325	-
LAST 90 DAYS	17	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

After manoeuvring on the ground for about 1 hour and 30 minutes, the pilot took off on the first test flight of this aircraft. The take-off was normal up to a height of about 50 feet. The pilot reduced the power, and the engine sputtered. A few moments later, the pilot lost control of the aircraft which then crashed to the ground.

The aircraft had been built with components from an ultralight aircraft; the original aircraft had been modified. The new aircraft was too heavy to enter the ultralight aircraft category; it had not been built in accordance with the requirements for amateur-built aircraft, and a flight permit had not been issued by the Department of Transport. The pilot, who had a private pilot licence, had received no flight training on ultralight aeroplanes.

The pilot did not realize that when he reduced the power a loss in speed would result. After take-off, he reduced the engine power while maintaining a nose-up attitude. A substantial loss of speed resulted, and, since there was only a slight difference between the climb speed and the stall speed, the aircraft stalled. It stalled suddenly at too low an altitude to effect a recovery.

FINDINGS:

Cause Related:

1. As a result of a reduction in power, the pilot did not modify the aircraft's attitude, and the aircraft quickly decelerated until it stalled.
2. The altitude at which it stalled was too low to effect a recovery.

Other:

1. The aircraft had not been built in accordance with requirements for amateur-built aircraft, and a flight permit had not been issued by the Department of Transport.

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ZENITH CH300 TRI-Z (Amateur-Built) C-GLRY
STANLEY, NOVA SCOTIA
7 SEPTEMBER 1985

REPORT NUMBER: 85-A50024 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1305 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	192	97
LAST 90 DAYS	22	22

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot returned to the circuit after a short local flight and planned a short field landing. On final approach, with the airspeed at 70 mph, the pilot selected 40 degrees of flap and closed the throttle 10 feet above ground level (agl). The nose dropped immediately, and the application of full up elevator was ineffective in maintaining pitch control. The aircraft landed hard; the nose gear collapsed, and the aircraft slid to a stop on the runway.

The aircraft builder had installed a larger engine than the manufacturer's plans had called for and, in so doing, had extended the motor mounts further forward than normal. The pilot had flown the aircraft for 97 hours since he had purchased it; however, this was the first time he had used more than 10 degrees of flap for landing. Records show that the original weight and balance calculations made by the builder were in error and that the

centre of gravity (C of G) was actually five inches forward of the allowable limit.

The investigation revealed that a Zenair news bulletin recommended that flap selection for the CH300 be limited to a maximum deflection of 25 degrees. Flap selection of 30 or more degrees disturbs the airflow over the horizontal tail and results in reduced pitch controllability.

When the throttle was closed, the propwash over the elevators was also reduced, a condition which further degraded their effectiveness in maintaining stability about the pitch axis.

The combined effect of an unacceptable forward C of G, an excessive flap selection, a relatively low airspeed, and a decreased propwash over the elevator control surfaces caused a loss in pitch stability and control. As a result, the pilot's control inputs were ineffective in preventing the hard nose-down landing.

FINDINGS:

Cause Related:

1. The combined effect of a forward C of G, excessive flap selection, relatively low airspeed, and decreased propwash over the elevator control surfaces caused a loss of pitch stability and control, a condition which made the pilot's control inputs ineffective in preventing the hard nose-down landing.

2. The hard landing caused the nose gear to collapse.

Other:

-Nil-

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Aviation Occurrence Reports

TIERRA II (Ultralight) C-IFML
SEPT-ÎLES, QUÉBEC 39 mi NW
17 SEPTEMBER 1985

REPORT NUMBER: 85-Q55011 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1000 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	74	65
LAST 90 DAYS	74	65

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was taking off from a small lake in a float-equipped ultralight. At an altitude of 100 feet above the water, the pilot reduced the engine rpm to the climb setting and raised the flaps. At this point, the ultralight began to lose speed and would not climb. The pilot landed the ultralight straight ahead, and, during the landing run, the right float struck a rock. The aircraft came to rest in some trees along the shore. The pilot was seriously injured.

The pilot reported that, when he examined the engine following the accident, the propeller drive belt was slipping, because there was oil from the engine exhaust on the belt. The drive belt and the reduction gear are both toothed; however, a loose and/or worn belt combined with the oil could have allowed the belt to slip.

FINDINGS:

Cause Related:

1. The engine did not deliver full power to the propeller because of belt slippage.

2. When the propeller lost power, the pilot elected to land the aircraft straight ahead, and, during the landing attempt, the aircraft was damaged.

Other:

-Nil-

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LAZAIR II (Ultralight) C-IJAN
PICTOU HARBOUR, NOVA SCOTIA
24 SEPTEMBER 1985

REPORT NUMBER: 85-A55010 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1530 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,400	1,200
LAST 90 DAYS	100	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was flying his float-equipped ultralight aircraft from Sydney, Nova Scotia to Moncton, New Brunswick with intermediate stops at Antigonish, Nova Scotia and Pictou, Nova Scotia.

On the first leg of the trip from Sydney to Antigonish, while on approach for landing, the left engine (KFM Model 107E) sputtered several times. The pilot noticed air bubbles in the clear plastic fuel line, and he transferred fuel from the auxiliary fuel tank to the main tank, after which the engine operated normally. After landing at Antigonish, the pilot rearranged the fuel lines by pulling the lines six inches out of the tank. He then took off for Pictou and on arrival he carried out a fly-pass by the Pictou Yacht Club. At an altitude 50 feet above sea level, the left engine sputtered and lost power. The pilot descended straight ahead for a downwind landing. The aircraft touched down on rough water and the right-hand float broke into two pieces, causing the left wing to swing around and the aircraft to nose over. The estimated winds at the time of the occurrence were from the southwest at 15 knots, and there was a 12-to-18-inch chop on the water.

Examination of the fuel system revealed that the plastic tube type fuel lines had a small screen attached to the end. The fuel lines entered the fuel tank at the top through the filler neck, and their length was six inches longer than the depth of the fuel tank. The fuel lines were not secured to the bottom of the tank, and the end of the fuel line for the left engine had curled up so that the inlet screen was above the 15-litre fuel level. With the fuel line in this position, air was allowed to enter the fuel line, causing the engine to sputter and lose power.

When the pilot repositioned the fuel line, he did not ensure that the fuel line was on the bottom of the tank so that all the fuel in the tank could be used. The investigation revealed that the fuel line was still curled up in the tank. As a result, when the fuel level dropped below the 15-litre level, air was able to enter the fuel line, causing the engine to once again sputter and lose power.

The aircraft landed with a high rate of descent due to the power loss on the left engine and a high forward speed because of the tail wind.

Material and stress analysis on the floats revealed that they were of sufficient strength to withstand normal operational loads. Calculations based on the weight of the aircraft, the rate of descent, the forward speed, and the chop on the water indicate that the floats were subjected to a higher than normal operating load, causing the right-hand float to break.

The following technical report was completed:
A55010TI - Material and Stress Analysis on the Floats.

FINDINGS:

Cause Related:

1. The left engine lost power because the end of the fuel line for the left engine had curled up above the fuel level in the tank, thus allowing air to enter the line.
2. A check to determine the unusable fuel quantity had not been carried out after the fuel lines were rearranged.
3. A combination of a high rate of descent, a high forward speed, and the chop on the water caused the right-hand float to break into two pieces on landing.

Other:

-Nil-

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JUNGSTER I (Amateur-built) C-GTUN
SPRINGBANK AIRPORT, ALBERTA
09 OCTOBER 1985

REPORT NUMBER: 85-W50055 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1419 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	200	0
LAST 90 DAYS	20	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

In preparation for the initial test flight on his amateur-built aircraft, the pilot had taken some dual instruction on another tail wheel type. On the run-up to full power, the engine was producing 2000 rpm. The pilot leaned the mixture and was able to obtain 2150 rpm. The mixture control was left at this setting for the take-off. On the day of the accident, his first take-off attempt ended in a ground loop, but the aircraft was not damaged. During the second take-off attempt as the aircraft became airborne, the engine lost power, and the aircraft settled onto a field off the end of the runway and nosed over.

During the engine runs carried out several days before the flight, the pilot noted that the engine was not producing full power as per the engine manufacturer's specifications. The carburettor was disassembled and reinstalled, and the wooden propeller was shortened about two inches. The engine power did not improve; however, the pilot decided to attempt a flight.

Following the accident, the engine was prepared for a test run, and it was discovered that when the fuel was turned on, the carburettor flooded. Once the engine was started, only 2000 rpm could be obtained with the mixture set at full rich. Leaning the mixture increased the rpm to 2250, and the engine would not develop full power at any setting other than a lean mixture setting. It was determined that a loose shaft on the carburettor control linkage resulted in an excessively rich mixture being supplied to the engine.

FINDINGS:

Cause Related:

1. The engine was unable to develop full power except at a lean fuel mixture setting because of a defective carburettor control linkage.
2. The lean fuel mixture resulted in an engine power loss after take-off.
3. The pilot was aware of the engine problem and elected to attempt a flight.

Other:

-Nil-

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VOLKSPLANE 1 (Amateur-built) CF-DAD
TRENTON, NOVA SCOTIA
22 NOVEMBER 1985

REPORT NUMBER: 85-A50033 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1640 AST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	791	1
LAST 90 DAYS	160	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft had been in storage for several years and was being flown for the first time by the new owner. After take-off for the fourth in a series of single circuit test flights, the engine (Volkswagon 1600 cc) started to run rough and lose power. The pilot flew a tight, low-level circuit. During the turn to base leg, the engine lost all power. The pilot lowered the nose and began a side-slipping turn toward the runway. The aircraft descended rapidly, crossed through the approach path, and was flying parallel to the runway in a near-level attitude when it struck the ground. The pilot, who was not wearing his shoulder harness, was seriously injured.

All four test-flight circuits were conducted on the same day. During the first circuit, the engine ran normally but indicated low oil pressure and high oil temperature. A leaking oil seal around the oil cooler was replaced, and

no further oil pressure or temperature problems were encountered. During the second circuit, the engine ran rough. This was attributed to the manual choke slipping toward the closed position. The choke was repaired. The engine again ran rough during the third circuit.

Carburettor heat was applied, but the engine continued to run rough for the entire circuit. After the flight, the spark plugs were checked and found to be normal. No further examination of the engine was done before the fourth flight, other than a run-up, which was normal.

Following the accident, an extensive examination of the engine and all accessories did not reveal any failures or deficiencies which could have caused the symptoms encountered during the test flying. The engine was equipped with a modified carburettor, the purpose of which was to help prevent the formation of carburettor ice.

There is no official weather observing station at Trenton. The temperature was at or near freezing, and the temperature/dew point spread was no more than one degree. Under this condition, there is a high risk of carburettor ice forming. The wind was reported to be light from the northeast.

The area immediately to the west of the button of runway 07 is not suitable for landing because of hilly terrain and houses.

Because the engine displayed symptoms normally associated with carburettor ice and because of the high risk of carburettor ice forming, there is little doubt that carburettor ice caused the engine to lose power and finally to stop.

Because of the deterioration in engine performance, the pilot was flying a tight, low-level circuit. When the engine stopped, the aircraft was in a position from which a very tight side-slipping turn was required. The pilot was not familiar with the gliding characteristics of this aircraft, but, even if he had been, it is doubtful that the aircraft could have been manoeuvred to the runway from where the engine stopped. The aircraft entered a high rate of descent from which the pilot was unable to recover before the aircraft hit the ground.

The facial injuries sustained by the pilot would have been reduced, or even eliminated, had he been wearing his shoulder harness.

FINDINGS:**Cause Related:**

1. The pilot did not determine the cause of the engine problem encountered during the third flight, before attempting the fourth flight.
2. A buildup of carburettor ice caused the engine to lose power and eventually to stop.
3. The formation of carburettor icing occurred although the engine was equipped with a modified carburettor.
4. When the engine stopped, the aircraft was not in a position from which it could glide to the runway.
- 5. The use of the shoulder harness would have minimized the pilot's injuries.

Other:

- Nil -

→ → → → →

ZENITH TRI-Z 300 (Amateur-built) C-GMNY
RIVERTON, NOVA SCOTIA
01 DECEMBER 1985

REPORT NUMBER: 85-A50034 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1245 AST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,052	9
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was on an overshoot following a baulked landing when the engine lost power. The pilot force-landed the aircraft straight ahead into a wooded area.

Earlier in the morning, the owner had arrived at his private airstrip to discover that someone had pilfered the fuel from his aircraft. He, and a friend who was going to fly the aircraft, poured 2 four-gallon cans of aviation fuel into the left tank. The pilot was going to fly a couple of circuits and then take the owner to a nearby airport to complete refuelling the aircraft.

Prior to flying the circuits, the owner and the pilot had discussed the fuel selector valve operation. There are no detents on the selector, and the valve is prevented from rotating through 360 degrees by two airframe mounted lugs that stop the selector in the 90-degree right or left position. The short arm of the selector handle is in the shape of an arrow and would lead one to believe that it would indicate the direction of the tank selected. The owner/builder could not remember the proper operation, even though he had installed the selector valve. The pilot was not very familiar with the aircraft because he had not flown it for two years. They finally agreed that the short arrow end of the selector and not the longer arm of the selector must indicate the fuel tank selected.

The longer arm of the fuel selector handle was actually the end that should have been used to indicate the fuel tank selected. By selecting the shorter, arrow end toward the left tank, where the fuel was known to be, the fuel was in fact being drawn from the right tank. There was only enough residual fuel remaining in the right tank for the engine to operate for a limited time. During the overshoot, the engine stopped because of fuel starvation.

The manufacturer of the aircraft kit was contacted and stated that even though the selector valve looked similar to the one supplied with the kit, the kit selector has positive detent positions. Also, on the selector valve supplied by the manufacturer, the small arrow arm of the handle does indicate the fuel tank selected.

The kit manufacturer stated that some amateur builders use components other than those supplied with the kit. In this occurrence, the owner/builder stated that he installed the selector valve that was supplied with the kit. Functionally, the selector valve operates well, if the operator makes the correct selection. However, the design of the selector valve allowed for the incorrect fuel tank selection.

FINDINGS:**Cause Related:**

1. The loss of power was caused by fuel starvation.
2. The fuel starvation resulted from the incorrect selection of the fuel selector valve.
3. Neither the owner nor the pilot confirmed correct fuel valve operation prior to the flight.
4. The fuel selector control was of poor design and could easily be operated incorrectly.

Other:

-Nil-

Annex 1

List of Reports by Aircraft Manufacturer and Type

REPORT BY AIRCRAFT MANUFACTURER AND TYPE

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
AERONCA	15	P50046	127
	7	Q50053	125
AEROSPATLE	AS 332	A50008	182
BEAVER	RX550	P55006	224
		Q55001	208
		Q55004	213
		O40071	204
BEDE	BD4		
BEECH	18	H50005	49
		P40038	66
		Q50002	58
		W54027	166
	200		
	23	O44084	104
	35	Q50070	134
		W40026	93
	90	H50004	169
		H50006	172
		W54123	37
		C40096	57
	95		
	99	W54056	39
	WIII	C50033	42
	204B	W50047	192
	205A1	P50037	190
	206	A50019	188
		C40091	198
		P50019	186
		P50028	189
		Q50010	182
		Q50011	184
		Q50067	194
		W40054	175
		W40066	177
		W50068	195
	412	P44009	174
	47	C50021	184
		C50058	189
		W50009	109
BELLANCA	TECA		
	SCOUT	O50021	146
BIRDMAN	ATLAS	Q50040	123
		W45006	203
		W45011	205
	CHINOC	P55007	225
		Q55002	209
BOEING	727200	Q55007	222
		W45003	201
		A44048	12
		O44026	9
	737200	O54926	40
		Q54003	13
		A54099	45
		H40003	4
		P54045	46

Annex I

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
BOEING (cont'd)	767200	Q44903	3
		O44090	11
		O54183	81
		W54012	34
BOEING WICH BRITTNORMAN	75 BN2A	A50025	126
		Q54045	77
		W40027	29
		W50038	47
CANAERO CDN RAND CESSNA	TOUCP2 KR-1 140	O45026	207
		Q50012	212
		C50027	116
		Q50068	133
	150	W50022	117
		C50009	109
		O40079	105
		O50092	62
		P50002	108
		P50054	136
		Q40071	99
		Q40094	106
	152	W50037	123
		C50012	59
	170	O50009	110
		P50901	112
	172	Q50031	121
		A50023	85
		A50902	133
		A54098	159
		O50005	74
		P40041	56
		P54002	30
		Q30079	63
		Q40014	92
		Q40803	55
		Q50019	147
		Q50028	120
		Q50066	129
		W40003	54
		W50011	111
		W50051	127
	175	Q40046	139
		Q50033	82
	177	W50015	113
		A50027	157
	180	A50028	86
		C50047	150
		C50070	47
		C50071	154
		C50084	158
		O50903	124
		Q40024	137
		Q40080	141
		Q50034	151
		Q50035	151

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
CESSNA (cont'd)		Q50043	154
		Q50058	158
		Q50062	160
		W40005	90
		W40008	136
		W50001	143
		W50054	128
	182	P40039	96
		Q50052	84
		W40035	95
		W50002	107
		W50069	135
	185	A50012	78
		A50032	160
		C50010	145
		O50079	159
		P40044	140
		P50040	153
		Q40022	137
		Q40086	142
		Q50029	148
		Q50030	149
		Q50046	83
		Q50051	155
		W50019	38
		W50048	86
		W50058	53
	188	W50029	81
		W50030	120
	206	O50068	155
		P50907	131
		Q50016	38
		Q50025	43
		Q50036	152
		W50034	122
		W50052	87
		W50056	52
		W50065	89
	207	W50061	130
	310	Q40020	64
	337	C50026	116
		W34079	163
		W50005	73
	402	C50090	54
	404	Q54007	32
	500	C40095	72
CHAMPION	7GCB	Q50005	144
CONSOLIDATD	PBY5A	A50016	168
CONVAIR	CV580	O54186	23
COOT	AMPHIB	Q50020	214
CZECH	L13	O50033	212
		Q50017	215
DEHAVND CAN	DHC-7	P54046	27
	DHC2	A50002	74

Annex 1

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
DEHAVND CAN (cont'd)		C40086	69
		O50046	44
		Q50009	77
	DHC3	A50005	167
		C50005	31
		Q40001	28
	DHC6	Q40075	100
		W40062	67
		W40045	65
	B26	DC1010	16
DOUGLAS	DC3	C50014	18
	DC4	O50031	60
	DC8	A54037	21
	DC8 61	Q54022	17
	DC9 30	A54016	35
		O44031	10
		O44088	10
		O54028	14
		O54029	15
		O54185	21
DOUGLAS CF- EIPPER	18	W54009	165
	QKSILV	O55011	219
		W45008	204
ENSTROM FAIRCHILD	F28A	Q50063	197
	F27	A50010	117
		C54010	20
FAIRCHILDCA FISHER		W54110	129
	FH227	Q44011	2
	F11	P50003	33
GATES LEAR	FP101	A55005	219
	25B	O54045	75
	35	W54058	119
GRUMMAN	CS2F	A44051	164
	G164	Q50047	84
		W40034	94
GRUMMANAMER HAWKER-SDLY	AA5	P40903	96
	HS748	O54188	25
		Q54047	19
HELIO ACFT HILLER ACFT	H391B	O40063	140
	12	P50015	185
		Q50054	226
HOMEBUILT HUGHES	269A	Q50050	191
		Q50056	193
	500	O50054	188
K&S JUNG 1 LOCKHEED		O50081	194
		P50035	196
		Q50018	185
MAULE		W40059	175
		W40065	176
		W50055	229
MITSUBISHI	188	C50083	88
	M5220C	C50034	43
		P40017	94
	MU2	P44013	70

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
MOONEY	M20	W40072	103
	M20B/C	O40004	91
NA ROCKWELL NORTHROP OSPREY PIPER	M20J	W44055	1
	M20K	Q50901	107
	THRUSH	W40037	65
	F-20	H50901	114
	2	A50022	221
	J3	Q50069	161
	PA12	Q40043	138
	PA18	O50039	146
		W40067	100
	PA22CP	O50063	125
		Q50004	144
		Q50021	118
	PA22TC	W40063	97
	PA23AZ	C50091	173
		Q40074	29
		Q40076	69
	PA24	Q40008	91
	PA24T	W44087	99
	PA25	A50014	78
	PA28	A50004	75
		A50007	60
		A50021	122
		C50019	113
		O40076	71
		O50022	59
		P40060	101
		Q40092	105
		W40002	90
		W40903	95
	PA31	A50003	110
		A50020	83
		O50902	76
		P50006	36
		P54004	37
		Q54088	48
	PA34	O50056	61
	PA38	A50029	61
		A50031	62
	PZLM18	Q50903	80
POLISH ACFT	S60A	O50061	222
RAVEN	RC3	Q50023	148
REPUBLIC	112	O44080	102
ROCKWELL	RALLY2	A55006	216
ROTEC	RALLY3	O55001	210
SAUNDERS	ST27	A54048	22
SCHEMP	STDAUS	W50036	220
SCHWEIZER	G164	Q50024	79
	SGS233	Q50026	217
SIKORSKY	S61N	H54001	178
SKYTREK	SKYSEE	O55007	216
		W35003	199
SLINGSBY	50	O50069	225

Annex I

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
SMITH MRSTW	DSA1	P44007	202
SONERAI	II	P50032	221
SOVIET	IL62	A54908	1
SPEZIO	TUHOL	A50017	218
STINSON	108	Q50071	162
STRIPLIN	SKYRAN	W35017	200
TAYLORCRAFT	B/B12	C50094	135
TERRATORN	TIERRA	Q45003	205
		Q45004	206
		Q55003	210
		Q55011	228
THOR	1A	A55001	208
THURSTON	TSC1A	O50066	156
TRI-ZENITH	CH-300	A50034	231
		Q40019	202
ULTRAFLIGHT	LAZAIR	A55003	211
		A55008	224
		A55009	226
		A55010	228
		Q35009	199
		Q35011	200
ULTRALIGHT	MIRAGE	A55002	211
		A55007	223
ULTRALITE	WIZARD	A55004	214
VOLKSPLANE	VP-1	A50033	230
WOODSTOCK		Q50027	217
WREN ACFT	460	C40075	98
ZENITH	CH 300	A50024	227

Annex 2

List of Reports by Province/Territory of Occurrence

REPORTS BY PROVINCE/TERRITORY OF OCCURRENCES

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Over Atlantic	85-03-19	A54908	1
Alberta	83-04-17	W35003	199
	83-11-06	W34079	163
	83-11-22	W35017	200
	84-01-03	W40002	90
	84-01-14	W40003	54
	84-02-16	W40008	136
	84-02-19	W45003	201
	84-03-22	H40003	4
	84-04-24	W40026	93
	84-06-13	W40034	94
	84-06-20	W44055	1
	84-06-23	W40037	65
	84-07-01	W45006	203
	84-07-13	W40045	65
	84-08-04	W40054	175
	84-08-30	W44087	99
	84-09-21	W40067	100
	84-10-10	W45011	205
	84-11-04	W40072	103
	85-01-03	W50001	143
	85-01-05	W50002	107
	85-02-14	W54012	34
	85-03-01	W50009	109
	85-03-06	W54027	166
	85-03-20	W50011	111
	85-05-01	W50015	113
	85-05-21	W50019	38
	85-05-27	W50022	117
	85-06-04	W54058	119
	85-06-18	W50029	81
	85-06-22	W50030	120
	85-07-11	W50034	122
	85-07-14	W50036	220
	85-08-05	W50037	123
	85-09-09	W50048	86
	85-09-23	W50051	127
	85-10-09	W50055	229
	85-10-14	W50056	52
	85-10-18	W50058	53
	85-10-30	W54110	129
	85-11-08	W50061	130
	85-11-20	W50065	89
	85-12-07	W50069	135
British Columbia	84-05-11	P40017	94
	84-06-10	P44007	202
	84-06-15	P44009	174
	84-07-26	P40038	66
	84-07-29	P40039	96
	84-08-03	P40041	56
	84-08-08	P40903	96

Annex 2

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
British Columbia (cont'd)	84-08-13	P40044	140
	84-08-22	W40063	97
	84-09-02	W45008	204
	84-10-08	P40060	101
	84-10-25	P44013	70
	85-01-02	P54002	30
	85-02-08	P50002	108
	85-02-14	P50003	33
	85-03-19	P50006	36
	85-04-08	P54004	37
	85-04-12	P50901	112
	85-05-30	P50015	185
	85-06-29	P50019	186
	85-07-17	P50028	189
	85-07-17	P54045	46
	85-07-21	P50032	221
	85-07-27	P50035	196
	85-07-29	P50037	190
	85-08-13	P50040	153
	85-08-15	P55006	224
	85-08-25	P55007	225
	85-09-24	P54046	27
	85-09-28	P50046	127
	85-09-28	W50052	87
	85-11-21	P50907	131
	85-12-07	W50068	195
	85-12-08	P50054	136
Manitoba	84-08-28	C40075	98
	84-11-30	C40091	198
	84-12-19	C40096	57
	85-02-10	C50009	109
	85-02-12	C50010	145
	85-03-23	C50014	18
	85-05-06	C50021	184
	85-05-17	C50026	116
	85-05-17	C50027	116
	85-06-30	C50047	150
	85-07-21	C50058	189
	85-08-15	C50070	47
	85-10-03	C50084	158
	85-11-05	C50090	54
	85-11-07	C50091	173
	85-12-07	C50094	135
New Brunswick	84-12-10	A44051	164
	85-01-19	A55001	208
	85-03-15	A54016	35
	85-05-18	A55003	211
	85-06-05	A50014	78
	85-07-05	A55005	219
	85-07-24	A50022	221
	85-09-05	A55009	226
	85-09-26	A50029	61
	85-10-07	H50006	172
	85-10-22	A50031	62

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Newfoundland & Labrador	85-02-14	A50002	74
	85-03-14	A50003	110
	85-04-11	A50005	167
	85-04-27	A50008	182
	85-05-14	H50901	114
	85-05-27	A50010	117
	85-05-31	A50012	78
	85-06-30	A50016	168
	85-07-11	A50019	188
	85-07-21	A50020	83
	85-08-02	A54048	22
	85-09-17	A50027	157
	85-09-21	A50028	86
	85-10-03	A54098	159
	85-11-14	A50032	160
Nova Scotia	84-12-11	A44048	12
	85-03-20	H54001	178
	85-04-14	A50007	60
	85-05-11	A55002	211
	85-05-28	A55004	214
	85-06-15	A55006	216
	85-07-04	A54099	45
	85-07-20	A50021	122
	85-08-10	A55007	223
	85-08-13	A55008	224
	85-09-07	A50024	227
	85-09-08	A50025	126
	85-09-24	A55010	228
	85-11-22	A50033	230
	85-12-01	A50034	231
NorthWest Territories	85-12-03	A50902	133
	84-02-01	W40005	90
	84-02-21	Q44011	2
	84-06-30	W40903	95
	84-08-09	W40059	175
	84-08-18	W40062	67
	84-09-12	W40066	177
	85-01-23	W50005	73
	85-02-03	W54009	165
	85-04-04	W54123	37
	85-05-31	W54056	39
	85-06-05	C50033	42
	85-08-19	C50071	154
	85-09-09	W50047	192
Ontario	84-02-25	O40004	91
	84-05-04	O44026	9
	84-05-11	O44031	10
	84-09-12	O40063	140
	84-10-06	O40071	204
	84-10-24	O44080	102
	84-10-25	C40086	69
	84-11-04	O44084	104
	84-11-06	O40076	71
	84-11-15	O44088	10

Annex 2

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Ontario (cont'd)	84-11-20	O44090	11
	84-12-02	O40079	105
	84-12-15	C40095	72
	84-12-23	O45026	207
	85-01-15	C50005	31
	85-02-06	O50005	74
	85-02-24	O54028	14
	85-02-24	O54029	15
	85-03-02	O50009	110
	85-03-05	O54903	16
	85-03-13	O55001	210
	85-03-22	O50021	146
	85-03-25	O50022	59
	85-04-03	O54045	75
	85-04-12	O50902	76
	85-05-15	O50031	60
	85-05-19	O50033	212
	85-06-01	O50039	146
	85-06-02	O54926	40
	85-06-05	C50034	43
	85-06-08	O55007	216
	85-06-21	O50046	44
	85-07-08	O50054	188
	85-07-08	O54183	81
	85-07-13	O55011	219
	85-07-19	O50056	61
	85-07-22	O54185	21
	85-08-08	O50061	222
	85-08-09	O54186	23
	85-08-12	O50903	124
	85-08-15	O54188	25
	85-08-17	O50063	125
	85-08-30	O50068	155
	85-09-01	O50069	225
	85-09-02	O50066	156
	85-09-28	C50083	88
	85-10-09	O50079	159
	85-10-16	O50081	194
	85-12-04	O50092	62
Prince Edward Island	85-03-17	A50004	75
	85-06-30	A54037	21
	85-07-01	A50017	218
Quebec	85-09-07	A50023	85
	83-07-10	Q35009	199
	83-10-22	Q35011	200
	83-11-20	Q30079	63
	84-01-02	Q40001	28
	84-02-04	Q40008	91
	84-02-29	Q44903	3
	84-04-11	Q40014	92
	84-04-28	Q40019	202
	84-05-02	Q40020	64
	84-05-15	Q40022	137
	84-05-21	Q40024	137

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Quebec (cont'd)	84-06-29	Q40803	55
	84-07-21	Q40043	138
	84-07-22	Q40046	139
	84-09-08	Q40071	99
	84-09-18	Q40075	100
	84-09-19	Q40074	29
	84-09-22	Q40076	69
	84-09-26	Q40080	141
	84-10-20	Q40086	142
	84-11-07	Q40092	105
	84-11-25	Q45003	205
	84-12-14	Q45004	206
	84-12-21	Q40094	106
	85-01-04	Q50901	107
	85-01-09	Q50002	58
	85-01-14	Q54003	13
	85-01-19	Q55001	208
	85-02-04	Q50004	144
	85-02-07	Q54007	32
	85-02-11	Q50005	144
	85-03-07	Q54022	17
	85-03-10	Q55002	209
	85-03-23	Q55003	210
	85-04-15	Q50010	182
	85-04-15	Q54045	77
	85-04-17	Q50009	77
	85-05-02	Q50011	184
	85-05-04	Q54047	19
	85-05-26	Q50012	212
	85-05-28	Q55004	213
	85-05-29	Q50016	38
	85-05-31	Q50018	185
	85-06-01	Q50021	118
	85-06-02	Q50017	215
	85-06-02	Q50019	147
	85-06-02	Q50020	214
	85-06-07	Q50023	148
	85-06-08	Q50024	79
	85-06-09	Q50903	80
	85-06-14	Q50025	43
	85-06-15	Q50026	217
	85-06-22	Q50027	217
	85-06-25	Q50028	120
	85-06-27	Q50029	148
	85-06-30	Q50030	149
	85-07-05	Q50031	121
	85-07-15	Q50033	82
	85-07-18	Q50034	151
	85-07-21	Q50035	151
	85-07-22	Q50036	152
	85-07-27	Q50040	123
	85-07-27	Q55007	222
	85-08-14	Q50043	154
	85-08-16	Q50046	83

Annex 2

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Quebec (cont'd)	85-08-21	Q50047	84
	85-08-22	Q54088	48
	85-08-27	Q50050	191
	85-08-27	Q50051	155
	85-08-29	H50004	169
	85-09-02	Q50052	84
	85-09-03	Q50053	125
	85-09-07	Q50054	226
	85-09-16	Q50056	193
	85-09-17	Q50058	158
	85-09-17	Q55011	228
	85-09-30	H50005	49
	85-10-24	Q50062	160
	85-10-27	Q50063	197
	85-11-08	Q50066	129
	85-11-21	Q50067	194
	85-11-24	Q50068	133
	85-11-26	Q50069	161
	85-12-06	Q50070	134
	85-12-14	Q50071	162
Saskatchewan	84-06-13	W40035	95
	85-03-01	C50012	59
	85-04-28	C50019	113
	85-05-13	C54010	20
Yukon	84-04-25	W40027	29
	84-09-01	W40065	176
	85-07-17	W50038	47
	85-10-03	W50054	128